The Christchurch Hospital

MEDICAL MANUAL

THIRD EDITION—JANUARY, 1951

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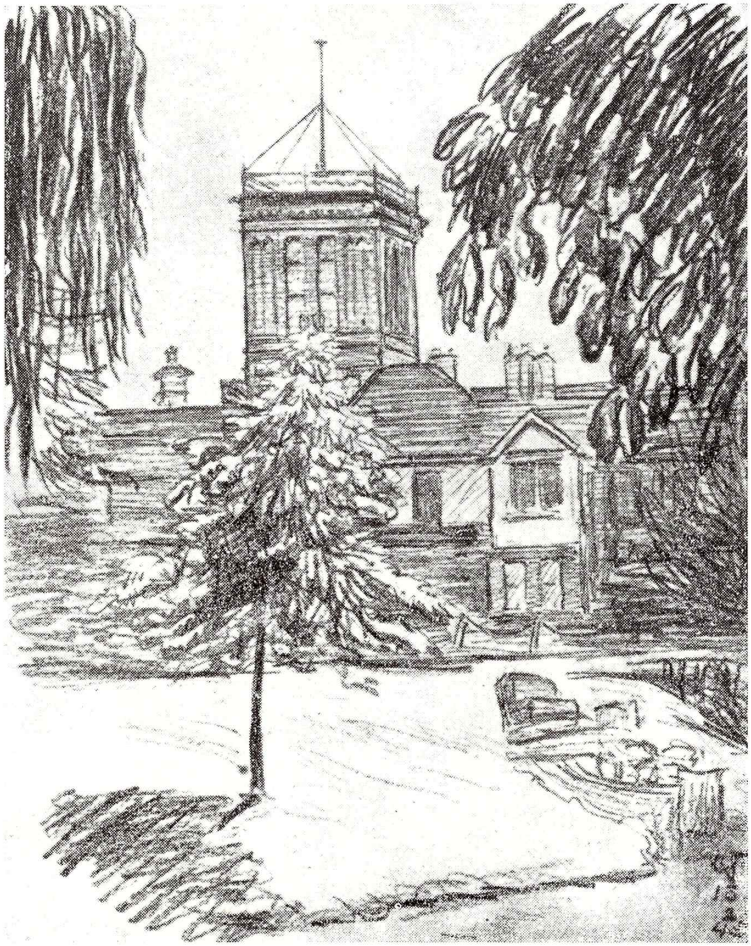

THE CHALMERS WARDS
CHRISTCHURCH HOSPITAL

The

CHRISTCHURCH HOSPITAL

MEDICAL MANUAL

Edited by

C. T. HAND NEWTON

D.S.O., M.D., F.R.A.C.P., F.R.C.S. (EDIN.)

FIRST EDITION—JULY, 1945

SECOND EDITION—MARCH, 1947

THIRD EDITION—JANUARY, 1951

Published by

N. M. PERYER LIMITED

Christchurch, New Zealand

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Preface to the Third Edition

THE scope of the *Hospital Manual* remains the same, but recent advances in medicine have necessitated alterations in most sections of the book. In this connection I have received much assistance from Dr. Denis T. Stewart and other Directors of Departments, as well as from Dr. C. Graham Riley and Miss Esmé Ussher.

C. T. H. N.

Introduction

A METROPOLITAN HOSPITAL is an exceedingly complex organisation, and the treatment and happiness of the patients depend on many factors, both material and personal. Failure in co-ordination or harmony in one section of the hospital may easily jeopardize success of the whole, and in no field of human endeavour is team work so essential as in a large modern hospital.

Control of policy is exercised by the Chairman and Members of the Hospital Board, but the responsibility for the personal care of the patients rests with the Medical Superintendent and the Lady Superintendent in association with the Medical and Nursing Staffs.

The Secretary also, with a large Clerical Staff, has responsible and onerous duties to perform.

The complexities of modern medicine require the full use of the Ancillary Services, and their extension is constantly taking place. These include the departments dealing with Pathology, Radiology, Radium and X-ray Therapy, Physio-therapy, Dentistry, Dietetics and the Dispensary.

In addition to its many other functions, the hospital acts as a training centre for Nurses, Dietitians and Massage Students, and has an important duty in assisting in the training of Medical Students.

This manual makes no attempt to describe in detail these various activities, but concentrates on certain aids to clinical diagnosis, and the dieting of the patients in the wards.

The diets detailed are for routine use, and will obviously require modification in the treatment of many cases.

PATHOLOGY DEPARTMENT

(*Director of Pathology*: DR. DENIS T. STEWART)

GENERAL

1. ALL SPECIMENS sent to the Laboratory for examination must be clearly labelled with the patient's name, ward, date, and the Physician's or Surgeon's name, and must be accompanied by a requisition form.
2. No report will be issued unless the REQUISITION FORM is completely filled in and signed by the full name of the Medical Officer. The NAME of the PATIENT should be in block letters. Reference to previous reports may be made by quoting their SERIAL NUMBERS.
3. When PROGRESSIVE EXAMINATIONS are required, some note of the diagnosis and clinical progress of the patient should be given, and in order to permit interpretation of the results the treatment employed should be mentioned. The original report form should be used for requests for progress examinations.
4. LABORATORY HOURS are from 9 a.m. to 5 p.m. daily, Monday to Friday inclusive. On SATURDAYS the Laboratory is open from 9 a.m. to 12 noon for URGENT or SEMI-URGENT WORK only. Test Meals, Routine Urines, Glucose Tolerance and Urea Clearance tests, etc. are not accepted on Saturdays except by special arrangement.
5. URGENT EXAMINATIONS will be done at any time. The requisition form should be clearly so marked by the Medical Officer.
6. When the LABORATORY is CLOSED (after hours, over the week-end, and on public holidays), only URGENT WORK is accepted. The Medical Officer requiring the examination to be made must make personal contact by telephone or interview with the TECHNICIAN on DUTY. Specimens or requisitions must not merely be deposited in the Laboratory. If out of the Hospital the technician will leave a telephone number at the Telephone Office.
7. ROUTINE or NON-URGENT SPECIMENS and REQUISITIONS should be in the Laboratory by 9 a.m. Those arriving after 2 p.m. may not be dealt with until the next day. In general it is better to leave collection of these late specimens until early next morning as more reliable results may be obtained using fresh specimens.
8. All specimens should be sent to the Laboratory as soon as possible after collection. This applies especially to Swabs, Cerebro-spinal Fluids, Faeces for Amoebae, and material from Test Meals and Urea Clearance Tests.
9. The MATERIAL to be sent, the QUANTITY required, and the CONTAINER to use are indicated on the following pages.
10. APPROPRIATE TESTS in various diseases are indicated on pages 30-37.

LABORATORY TESTS
Indications, Methods, Interpretations.

ACCURACY OF TESTS

It is important to realise that in all tests, no matter how skilled the technician, there is an experimental error. The possible effect of this error (which in some tests may alter the result by plus or minus ten per cent) must be kept in mind in comparing successive results of the same test.

ALIMENTARY SYSTEM

FRACTIONAL TEST MEAL

Preparation of Meal:

Two tablespoonsful of oatmeal are placed in two pints of water and boiled down to one pint. The meal is now strained through muslin (this is most important) and should become the consistency of jelly. Sugar but NO salt may be added.

Preparation of Patient:

No drugs should be given the day before. The last meal or drink of any sort should be at least 12 hours prior to the test. At this meal two teaspoonsful of powdered charcoal are given in a glass of milk. IT IS IMPORTANT to give the patient a sputum mug and instruct him or her to EXPECTORATE ALL SALIVA during the test.

Laboratory Equipment Required:

Two large test tubes or bottles and seven small test tubes with rack are obtained from the Laboratory. The large tubes or bottles are labelled "0 Hours" and "3 Hours". The seven small tubes are labelled $\frac{1}{4}$, $\frac{1}{2}$, $\frac{3}{4}$, 1, $1\frac{1}{2}$, 2, $2\frac{1}{2}$ hours.

The Test:

At 7 a.m. a stomach tube is passed to a length of 16 to 20 inches. If nothing can be obtained it is passed to 20 to 24 inches. In some persons it may have to be passed up to 30 inches. The stomach is emptied of all its contents by suction with a syringe and the whole volume is placed in the bottle labelled "0 Hours". The meal is now given, and at the intervals indicated in the labelling of the tubes samples of about 10 cc are withdrawn and placed in the appropriate tube. At the end of three hours the stomach is completely emptied and the whole residue is placed in bottle "3 Hours". The tube is withdrawn and the collected specimens sent with the requisition form to the Laboratory as soon as possible.

Notes:

1. Change of the patient's posture facilitates complete aspiration of the "0" and "3 Hours" specimens.
2. If the tube blocks clear by pushing AIR down it with a syringe.
3. Too forceful suction may damage the gastric mucous membrane and cause haemorrhage.

Results:

Hypochlorhydria—free acid never exceeds 15 cc N/10 per cent.
Hyperchlorhydria—free acid exceeds 60 cc N/10 per cent.
Achlorhydria—complete absence of free acid.

The only constant test meal finding is that of achlorhydria in Addison's anaemia. Most cases of carcinoma of the stomach show hypochlorhydria or achlorhydria; some show obstruction with fermentation of secretion and haemorrhage. Gastric ulcers give no typical findings. Most cases of duodenal ulcer are associated with hyperchlorhydria. Pyloric spasm or obstruction is suggested by a plateau or climbing curve and delayed emptying. Absence of starch throughout suggests faulty technique.

HISTAMINE TEST MEAL

This is designed to confirm the presence of achlorhydria. It is not feasible in allergic patients. The dispensary will supply Histamine Acid Phosphate in solution (1 mgm per cc).

Method:

1. Empty the stomach completely after passing the tube and again 15 minutes later.
2. Inject 0.5 mgm histamine subcutaneously.
3. Withdraw 10 cc specimens at intervals of 15 minutes up to 2 hours.
4. Place specimens in labelled containers as for ordinary test meal and send to Laboratory.

GASTRIC CONTENTS FOR CARCINOMA CELLS

The fasting juice should be aspirated (after injecting a few ccs. of normal saline if there is difficulty in obtaining a specimen). The fluid should be sent immediately to the laboratory with a form clearly stating that cytology for carcinoma cells is required and marked urgent.

FAECES

I. **OCCULT BLOOD.** Meat must be omitted from diet for three days but fish, eggs and vegetables of any kind may be eaten. The bowels must open daily but enemata should not be given. The specimen is collected on the fourth day.

Alternatively 3 charcoal biscuits may be given at the beginning of the three day meatless period, and a specimen taken after the charcoal has appeared in the stool. The patient must not use a tooth brush during the period. A search should be made for any source of bleeding at either end of the alimentary tract.

About an ounce of faeces should be sent. If occult blood is found by laboratory test a microscopic examination is made for red blood cells and muscle fibres; their presence negatives the result.

II. **MICROSCOPIC EXAMINATION OF FAECES** for muscle fibres, fatty acid crystals, soap-plaques, etc. may give information useful in estimating PANCREATIC or BILIARY FUNCTION. It should be done before the fat content is requested.

III. **FATS.** About 30 cc (one ounce) of ordinary faeces should be sent in a carton. If liquid about three times as much should be sent in a suitable widemouth jar.

RESULTS: Normally fat should not exceed approximately 25 per cent of faeces and not more than 25 per cent of this fat should be in the unsplit state. It is important to remember that the action of colonic bacteria may cause extensive splitting of fat.

IV. **DYSENTERY.** In cases of dysentery the special water-jacketed pan should be used. The pan should be cleaned by boiling or steam-sterilising: disinfectants must not be used. When the patient is ready to produce a specimen the lower part of the pan is half filled with water so hot that the hand can just be held in it. The top half of the pan is fitted on and the whole placed in the special commode. The patient is given a urinal and receptacle for paper and instructed not to urinate or put paper into the pan. Immediately the specimen has been produced the lid is put on the pan and the whole is sent to the Laboratory. The specimen must be examined within a quarter of an hour of being produced.

Amoebiasis

For the diagnosis of amoebiasis, the following should be done:

(1) Two or three samples of ordinary faeces (about the size of a walnut) should be submitted for examination for cysts.

(2) Preferably the patient should be admitted to hospital overnight, when an "amoebic purge" is given as follows:

At 4.0 a.m. give Calomel grains 3.
At 8.0 a.m. give Mag. Sulph. drachms 4.
At 8.30 a.m. give Breakfast. No extra fluids.

The first six specimens produced are to be sent to the Laboratory, using the special pan and method described above. If there is no specimen by 9 a.m. or difficulty in obtaining six specimens one or two drachms of Mag. Sulph. may be given hourly until the specimens are produced. The patient should not be discharged until it is ascertained from the Laboratory that no further specimens are required in addition to the six.

V. **BACTERIA and PARASITES.** In enteric fever, in suspected parasite infestation, and when other bacteriology is required, about an ounce of soft faeces (including pus, blood or mucus if present) should be sent in a cardboard carton or jar. The whole of each stool passed after vermifuges should be sent for identification of worms.

For the diagnosis of threadworm infestation a cellophane-covered swab is used. This is scraped firmly over the perianal skin by the patient or attendant. Ova and larvae adhere to the cellophane, which is subsequently spread out on a slide and examined microscopically.

PANCREATIC FUNCTION

The detection of pancreatic dysfunction is not easy. The various secretions of the gland may be tested as under:—

1. DIASTASE

(a) in Blood (Serum). In acute pancreatitis the serum diastase is usually increased, rising rapidly to high values about 24-48 hours after the onset of the attack and often falling to relatively normal values in the next 24 hours. Normal values: 4-32 Units per 100 cc. 5-6 cc blood in a plain tube is required.

In chronic pancreatitis diastase estimations on random specimens are of little value, but obstruction to the outflow of diastase may sometimes be demonstrated by an increase in serum diastase after stimulation of secretion by prostigmine or secretin. For details consult Biochemist.

(b) in Urine. In acute pancreatitis there is usually a marked increase which reaches a maximum 24-48 hours after the onset of the attack. Normal values: 8-32 Wohlgemuth units; doubtful: 100 units; diagnostic: more than 200 units. Send 50-100 cc urine. The estimation is of little value in diagnosis of chronic pancreatitis but an increase in diastase excretion may be demonstrated in a 24-hour collection of urine.

2. TRYPSIN

(a) Absence of this ferment results in the presence of undigested muscle fibres in the faeces ("Creatorrhoea").

(b) The faeces of most normal infants contain enough trypsin to digest the gelatin on an X-ray film: in pancreatic deficiency there is no digestion of the gelatin.

(c) Duodenal contents may be obtained by intubation and the trypsin estimated before and after stimulation of the pancreas by olive oil, magnesium sulphate or secretin. For details consult Biochemist.

3. LIPASE

The faeces should be examined microscopically for fat globules and then, if indicated, the amount of fat estimated chemically (see Faeces). Total fat content is of greatest significance for even in the absence of pancreatic lipase considerable splitting of fats may occur due to colonic bacterial action.

In children on a diet of whole milk, the absence of microscopic fat globules in the faeces rules out pancreatic deficiency.

4. INSULIN

There may be a transient rise in blood sugar in acute pancreatitis.

Occasional cases of chronic pancreatitis show an impaired glucose tolerance test.

LOEWI'S TEST: Compare size and reaction of pupils. Put 2 drops 1 in 1000 adrenalin in one eye. Examine at 15 minute intervals for 1 hour. The pupil dilates in acute pancreatitis, hyperthyroidism and in biliary tract disease.

	Urine Bilirubin	Faeces Stercobilin	Urine Urobilinogen	Serum Bilirubin
Normal Values	Absent	100-250 Watson Units	Absent or trace	0.2-0.8 mgm.%
Acute Infective (and Toxic) Hepatitis (= hepatocellular damage)	Present or absent	Increased or decreased	Present early: later varies	Usually increased: may be normal
Chronic Infective (and Toxic) Hepatitis and Active Cirrhosis	Present or absent	Increased or decreased	Present early: later varies	Often normal: variable
Latent "Portal" Cirrhosis (Diffuse and Post-Necrotic Fibrosis)	Usually absent	Usually normal	Present or absent	Normal or slightly increased
Recent Obstructive Jaundice	Present	Usually absent, but may vary	Absent	Increased
Prolonged Obstructive Jaundice (Biliary Cirrhosis)	Present in large amount	Absent	Absent	Increased markedly
Cholangio-Hepatitis and Pylephlebitis	Present or absent	Increased or decreased	Present or absent	Usually increased
Haemolytic Jaundice	Absent	Increased	Increased	Increased
Hydatid Cyst Secondary Tumour	Present or absent	Present or absent	Normal	May be increased by obstruction

LIVER

Differential Diagnosis of Jaundice and Tests of Liver Function

In any case of jaundice it should first be determined by questioning and clinical inspection that BILE PIGMENT is present or absent from the URINE or FAECES. If there is doubt the URINE may be sent for presence of BILIRUBIN and the FAECES for STERCOBILIN. An early sign of liver cell damage is failure of the liver to re-excrete urobilinogen absorbed from the bowel: the urinary urobilinogen is therefore increased in early infective or toxic hepatitis and is also increased when there is excessive absorption of urobilinogen after release of obstructive jaundice or in haemolytic jaundice, in both of which conditions the faecal stercobilin is increased.

But because hepatitis not infrequently passes through a phase suggestive of

Serum Thymol Turb. and Flocc. and Coll. Gold	Serum Albumin	Serum Alkaline Phosphatase	Brom-Sulphalein Retention	Remarks
No reaction	3.8-5.5%	4-15 units % (Armstrong & King units)	15 min < 25% 45 min < 5%	———
Usually positive: often strongly	Decreases with duration and severity	Usually below 25 units	Increased	Note that jaundice may be absent
Usually positive: often strongly	Decreases with duration and severity	May rise above 35 units	Increased	———
Sometimes positive	Often decreased	Often increased, especially if jaundiced	Often increased	All tests may be negative
Usually no reaction	Normal	Usually above 35 units	Not indicated	———
May be weakly positive	May be decreased	Markedly increased	Not indicated	There may be terminal severe hepatocellular damage
Usually positive	Tends to decrease	Normal	Not indicated	Usually fever, rigors, E.S.R., and leucocytes increased
No reaction	Normal	Normal	Not indicated	———
Usually no reaction	Normal	Normal or increased	Not indicated	Eosinophilia, H.C.F., Casoni

obstructive jaundice certain laboratory tests are often indicated in differential diagnosis. One group of these tests (done on blood serum) becomes positive when the serum globulin is altered in hepatocellular damage. These tests are: Serum Thymol Turbidity and Flocculation: Serum Colloidal Gold: and the Takata Ara Test.

Damage to the liver cells also impairs the synthesis of Serum Albumin which therefore falls in level progressively with severity and length of duration of hepatocellular damage.

Serum Bilirubin is usually, but not necessarily, increased in hepatocellular damage: it is always and more markedly, though variably, increased in obstructive conditions and successive observations may be of value in assessing progress. Simultaneously in obstructive conditions the excretion of Alkaline Phosphatase is lessened or prevented and this enzyme increases in the blood serum.

Hepatocellular damage results in a slighter increase of the enzyme. (Alkaline Phosphatase is concerned in bone formation and may be increased in certain bony disorders, e.g. Rickets: Paget's Disease: Osteitis Fibrosa.) It has been noted that in secondary carcinoma of the liver an increase in phosphatase occurs earlier and more markedly than increase in serum bilirubin.

All the above tests may be done on one sample of 15cc of clotted blood.

A BLOOD COUNT may also give information of value in jaundice, e.g. Anaemia and the film changes indicative of red cell destruction and microspherocytosis: increased sedimentation rate and leucocytosis in suppurative cholangitis and suppurative hepatitis.

The PLASMA PROTHROMBIN time or level may be lowered either by failure of absorption of Vitamin K in obstructive jaundice or by failure of synthesis from Vitamin K in hepatocellular damage. The result is an increased tendency to bleed from injuries and eventually spontaneous haemorrhage may occur. Hence the prothrombin time or level should be estimated before operation is performed on a patient jaundiced for more than a short time. Response of prothrombin level after oral or parenteral Vitamin K may differentiate obstructive and hepatic jaundice.

In the estimation of TOTAL LIVER FUNCTION OR RESERVE:

(1) The SERUM ALBUMIN level is of great value: a fall in Albumin roughly parallels the extent of hepatocellular damage and a fall below two per cent is of grave prognosis.
(2) The BROMSULPHALEIN RETENTION TEST may be done. After injection of 5 mgm Bromsulphalein per Kgm body weight the amount of dye retained in the blood is estimated at 15 and 45 minutes. Normally less than 25 per cent is retained at 15 minutes, and less than 5 per cent at 45 minutes.
(3) Other tests such as GALACTOSE TOLERANCE and HIPPURIC ACID EXCRETION can be done by special arrangement.

The table on pages 6–7 summarises the results of these tests in various types of jaundice and liver conditions.

LIVER BIOPSY

This is indicated in difficult cases of jaundice and liver enlargement, and is done by one of the published methods. Prerequisites are plasma prothrombin time and preparation for possible transfusion. The sample of liver obtained is placed in 10 per cent formalin.

RESPIRATORY SYSTEM

THROAT SWABS. Sterile swabs are issued by the Department. Local antiseptics must not be used for some hours before taking the swab. Especially in possible diphtheria, throat swabs should be taken by a Medical Officer. If there is adequate clinical reason to suspect diphtheria, a report on the swab should not be awaited before giving antitoxin. Dry swabs are useless for bacteriology; hence swabs must be sent to the Laboratory immediately they are taken.

Diphtheria organisms isolated in pure culture from patients not suffering from clinical diphtheria (i.e. from carriers, sore throats not clinically diph-

theritic, the nose and ears, wounds, etc.) may not be virulent for human beings, and are therefore tested by guinea pig inoculation. Virulent bacilli cause the death of a guinea pig in 2-4 days with characteristic post mortem findings.

POST-NASAL SWABS: A long swab with the terminal part bent at an angle of 45 degrees may be introduced behind the soft palate to collect secretion from the naso-pharynx. This is of value in the diagnosis of whooping-cough and the meningococcal carrier state.

SPUTUM should be collected in the early morning before the patient has any food. The mouth should first be rinsed several times with sterile water. The patient should expectorate directly into a carton, avoiding spitting on the outside. No water or antiseptic should be added.

In suspected TUBERCULOSIS, six such specimens should be sent. In certain cases the sending of a 24-hour collection of sputum may be advisable.

When there is no sputum LARYNGEAL SWAB CULTURE is of great value in detection of tubercle bacilli. A special long flexible swab is moistened in sterile water and passed into the larynx under direct vision (or with the aid of a laryngeal mirror) and rubbed round quickly. Such swabs should be sent for immediate culture. A further method of diagnosis when there is no sputum is to send the aspirated fasting stomach contents, or aspirated bronchial secretion.

CULTURES on special media may reveal tubercle bacilli in 3-6 weeks.

ANIMAL INOCULATION is valuable for confirmation or elimination of tuberculosis (e.g. in pleural effusion and ureteric urines). The result is available about 6 weeks following the inoculation.

In suspected NEOPLASM an early morning sputum should be sent. The requisition form should clearly indicate that cytology for neoplastic cells is desired. The sputum must be fresh for this examination.

PLEURAL FLUIDS. These should be collected into (i) A sterile test tube for bacteriology, (ii) An oxalate tube as for blood counts—not more than 5 cc. The oxalate prevents clotting and enables a more accurate cell count to be made.

SKIN TESTS for possible allergens in Hay Fever and Asthma may be arranged by appointment. Patients will not be accepted for skin testing unless a detailed history is given, clearly indicating the substances required to be tested.

VITAL CAPACITY OF LUNGS

Estimations are made by arrangement with the biochemical laboratory. The test is of value in the diagnosis and estimation of severity of such conditions as pulmonary tuberculosis, bronchiectasis, emphysema, fibrosis, pleural effusion, atelectasis, etc., and in left ventricular failure.

Results: These are shown as percentages of Meyer's normal values.

GENITO-URINARY SYSTEM

ROUTINE URINE SPECIMENS. The first morning specimen is to be collected in a thoroughly washed sterile screw-capped bottle. The bottle must be cooled after sterilisation. In men the meatus should be cleaned with spirit a small quantity of urine passed into a urinal (and discarded), and the remainder of the specimen ("Midstream") collected into the sterilised bottle. In women catheterisation is necessary if bacteriological examination is required and unless the requisition form specifies a catheter specimen bacteriological examination will not be made.

Results: see table of Urinary Syndromes on page 13.

URETERIC SPECIMENS are collected in sterile test tubes, carefully labelled.

SUSPECTED TUBERCULOSIS. (1) A 24-hour specimen may be sent in a winchester obtained from the laboratory or in an enamel pail. The collection period should be from 4 p.m. to 4 p.m., the specimen being sent for sedimentation overnight. The container should be kept in a refrigerator during the collection period to reduce growth of contaminating bacteria.

(2) *Alternatively*, several first morning specimens may be sent.

BIOLOGICAL TESTS FOR PREGNANCY, HYDATID MOLE, CHORION-EPITHELIOMA, AND TUMOURS OF TESTICLE

It is usually necessary to reserve an animal in advance. 50 cc or more of first-morning urine is collected into a (preferably sterile) container and forwarded in a sterile bottle. The fluid intake for the preceding 12-18 hours should be restricted.

Results:: In normal pregnancy the test may become positive as soon as 14 days after conception, and remains positive throughout, providing living placental tissue remains. False positives are rare, but false negatives are not uncommon, and may result from the use of urine which is too dilute, or the performance of the test too early in pregnancy, or from individual variation in hormone excretion.

In hydatid mole, chorion-epithelioma and certain testicular tumours, the test is usually positive even when urine diluted 100-fold is used. Complete removal of the hormone-secreting tissue will result in the test eventually becoming negative.

EXAMINATION OF SEMEN

A Pathologist should be consulted as to methods of obtaining a suitable specimen. A condom must never be used.

Results: A sample of semen is considered abnormal if the volume is less than 0.5 cc; if spermatozoa number less than 30 million per cc (or if the total population of the specimen is less than 50 million); if motility is shown by less than 40 per cent of spermatozoa 6-8 hours after production of the specimen; if more than 50 per cent of spermatozoa are malformed.

URETHRAL and PROSTATIC SMEARS. A small drop of expressed pus or secretion should be smeared thinly between two slides or by using

a sterile loop. After drying in air the labelled slides should be wrapped and sent to the Laboratory.

VAGINAL and CERVICAL SWABS. Use sterile swabs for cervix, vagina, Bartholin's gland and urethra. Make immediate thin smears on glass slides and send with swab. If TRICHOMONAS infestation is suspected place one cc of sterile normal saline in tube and push swab into fluid: keep tube vertical and warm during rapid transport to Laboratory.

CANCER DIAGNOSIS (PAPANICOLAOU METHOD)

Smears of vaginal secretion or of cervical scrapings should be made on clean glass slides and immediately (while wet) placed for fixing in equal parts of absolute alcohol and ether for 10 minutes. The slides may then be removed, allowed to dry, carefully wrapped and sent.

TESTS OF RENAL FUNCTION

I. **ADDIS-FISHBERG (Concentration or Specific Gravity) Test**

Between 4 p.m. and 6 p.m. on the evening before the test a high protein meal (meat or eggs) should be given. Only 200 cc (a small cup) of fluid should be given. NO FOOD OR DRINK should be allowed after this hour until the test is completed. Failure to observe these conditions will give misleading results. The bladder is emptied before going to bed. On the morning of the test, at 7 a.m., 8 a.m., and 9 a.m., collect specimens of urine. If specimens cannot be obtained at these times, send the first three specimens available, the patient not having had anything to eat or drink. These should be clearly labelled with the time of the specimen and should be sent to the Biochemical Laboratory.

Results: A specific gravity of over 1025 in at least one specimen is regarded as indicating a satisfactory concentrating power of the kidneys. A maximum specific gravity of below 1020 is regarded as indicating impaired renal function —probably poor tubular concentrating power.

Indications: This is a valuable and simple test and should always be the first test of renal function if specimens can be satisfactorily collected. If the results indicate impaired function checking by another test should be considered.

II. **UREA CLEARANCE TEST** (Van Slyke)

The patient may have a light breakfast of tea and toast before the test. No urea is to be given to the patient.

At 8 a.m. (a) Give the patient one glass of water.
(b) The patient should completely empty the bladder. The exact time should be recorded and the specimen discarded.

At 9 a.m. (a) Another glass of water is given.
(b) The patient should completely empty the bladder, and the time should be carefully recorded. This is the first specimen and should be kept.
(c) 5 cc of blood should be drawn and placed in a biochemical oxalate tube and well shaken to prevent clotting.

At 10 a.m. The patient should again completely empty the bladder, and the time should be carefully recorded. This is the second specimen and should be kept.

It is essential that the following should be sent to the Biochemical Laboratory as soon as the test is completed:—

(1) The two specimens of urine (the whole specimens passed must be sent).
(2) The specimen of blood.
(3) The three times of emptying the bladder.
(4) The height and weight of the patient should be sent if these vary much from the normal range.

Indications: It is indicated in all cases suspected of having impaired renal function in which accurate collection of urine samples is possible, but is not necessary if the simpler blood non-protein nitrogen estimation shows retention of 50 mgm or over. It is not practicable in children under four years of age.

Normal Findings: The average maximum urea clearance (Cm) is 75 cc of blood cleared of urea per minute. The average standard clearance (Cs) is 54 cc of blood cleared of urea per minute. Normal values are usually reported as percentages of these figures, anything over 70 per cent being regarded as normal and under 60 per cent indicating impaired function. Under 20 per cent shows very poor function. Unless special care is exercised in the performance of this test the results will be useless and misleading.

III. UREA CONCENTRATION TEST

This requires no special preparation, but it is usually recommended that fluids be restricted for 12-18 hours. After emptying the bladder the patient is given 15 gms of urea dissolved in 150 cc of water, flavoured with tinct aurantii m. XV. One hour and two hours after the urea, specimens of urine are collected and sent to the Biochemical Laboratory.

Normal Findings: In a normal person, the first specimen (one hour after the urea) should contain at least 1.5 per cent urea, whilst the second specimen should have a minimum concentration of 2 per cent urea. Figures below these show a poor concentrating power of the kidney, and indicate renal inefficiency. If the volume of the first specimen is more than 120 cc and the second more than 100 cc, values below 2 per cent do not necessarily indicate deficient renal function. In such cases the test should be repeated.

This test is now being replaced by the urea clearance test.

IV. BLOOD FOR TOTAL NON-PROTEIN NITROGEN

Send 6 cc in biochemical oxalate tube. A level of over 50 mgms T.N.P.N. per 100 cc blood is commonly due to gross renal dysfunction. This test is especially valuable in acute nephritis and in the later stages of chronic nephritis.

URINARY SYNDROMES

Disease	S.G.	Albumin	R.B.C.	Pus	Casts	Bacteria	T.N.P.N.	Plasma Protein	Oedema	B.P.
Acute Glomerulo-Nephritis	Variable	Present	Present	Variable	Profuse Hyaline Granular and Epithelial	Absent	Normal to high	Variable	Usually present	Raised
Chronic Glomerulo-Nephritis	Low 1010-1015	Trace to small amount	Variable	Absent	Scanty Hyaline Granular and Epithelial	Absent	Normal to high	Normal to low	Nephrotic or Cardiac	Raised
"Nephrosis"	High 1020-30	Marked	Absent	Absent	Variable	Absent	Normal	Low	Present	Normal
Focal Nephritis	Normal	Trace to marked	Present often marked	Present	Usually present	Often present	Normal	Normal	Absent	Normal
Nephro-Sclerotic Kidney	Normal or usually diminished	Trace to small amount	Rare	Few cells	Scanty Hyaline and Granular	Absent	Raised in late stages	Normal	Absent unless Cardiac	Raised
Chronic Venous Congestion	High	Trace to moderate	Few	Absent	Some Hyaline and Granular	Absent	Normal to high	Slightly diminished	Cardiac	Variable
Pyelitis and Cystitis	Normal	Trace to marked	Few	Present	Absent	Present	Normal	Normal	Absent	Normal
Pyelo-Nephritis	Normal unless long standing when low	Trace to marked	Variable	Variable	Present	Present	Normal to high	Normal to low	Usually none unless Nephrotic or Cardiac	Normal to high

C.S.F. SYNDROMES

Condition	Pressure in Horizontal Position	Cells	Protein mg/100 cc	Chlorides mg/100 cc	Sugar mg/100 cc
Normal	70-180 mm.	0-10	15-45	700-750	50-80
Meningism	Increased	Normal	Normal to low	Normal to low	Normal
Acute purulent meningitis	Increased 200-750	Increased, usually over 500 mainly polymorphs	Increased up to 1500	575-700 Average 650	0-45
Tuberculous meningitis	Usually increased 150-750	25-500, mainly lymphocytes	Increased up to 500	525-675 Average 600	0-45
Aseptic meningeal reaction Brain abscess Sinus thrombosis, etc. Poliomyelitis Encephalitis Benign lymphocytic meningitis Syphilis of C.N.S.	Normal to slight increase	10-1,000, mainly lymphocytes	Normal to moderate increase	Usually normal	Normal
Brain tumour	Increased	Usually normal	Increased	Normal	Normal
Subarachnoid haemorrhage	Usually increased	Red cells with xanthochromic supernatant fluid	Increased	Normal	Normal
Blood-stained C.S.F. of traumatic origin	Normal	Red cells with colourless supernatant fluid	Normal or increased	Normal	Normal

NERVOUS SYSTEM

CEREBRO-SPINAL FLUID: The specimen should be collected into each of two sterile tubes, which are labelled "first" and "second". About one-third of each tube should be filled for a complete examination. The specimens should be sent to the Laboratory immediately, if a cell count is required. If an obviously purulent fluid is taken off when the Laboratory is closed, and it is not desired to know the infecting organism, the specimen should be placed in the incubator for later examination.

Results: See table of C.S.F. SYNDROMES on page 14.

HAEMOPOIETIC SYSTEM

BLOOD COUNTS. The blood for these is usually taken by a Laboratory Technician. For full examination 5 cc is withdrawn with a dry syringe from a vein after minimum compression of the vein and expelled gently into a special oxalate bottle. The bottle must be immediately thoroughly but gently shaken.

A Complete Blood Count consists of the following examinations, shown with their abbreviations and normal values:

RED CELL COUNT (R.B.C.)—Men: 4.5-6.0 million per cu. mm.
Women: 4.2-5.5 million per cu. mm.

This count is subject to an error of plus or minus 8-10 per cent.

HAEMOGLOBIN (Hb.)—Men: 14-18 grams per 100 cc.
Women: 12-16 grams per 100 cc.

The error varies with the method used.

COLOUR INDEX (C.I.)—0.9-1.1

PACKED CELL VOLUME (P.C.V.)—Men: 47 ± 7 per cent.
Women: 42 ± 5 per cent.

This estimation is subject to an error of only plus or minus 1 per cent.

MEAN CELL VOLUME (M.C.V.)—78-94 cubic microns.
(Cells of normal size are Normocytic.)
(Cells of increased size are Macrocytic.)
(Cells of decreased size are Microcytic.)

The experimental error due to use of Red Cell Count in calculation means that values between 73 and 106 cu. microns may be within the normal range.

MEAN CELL HAEMOGLOBIN CONCENTRATION PER CENT (M.C.Hb.Conc.%):—
32-38 per cent.
(Cells of normal haemoglobin concentration are Normochromic.)
(Cells of decreased, Hypochromic.)

ERYTHROCYTE SEDIMENTATION RATE (E.S.R.)—Men: 0-6 mm in one hour.
Women: 0-15 mm in one hour.

(Wintrobe's method is used.)

ICTERUS INDEX (I.I.)—4-7 units.

WHITE CELL COUNT (W.B.C.)—5,000-10,000 per cu. mm.

DIFFERENTIAL COUNT—

Polymorphs (Neutrophils): 57-72% or 2,800-7,200 per cu. mm.
Polymorphs Adult: 52-69% or 2,600-6,900 per cu. mm.
Polymorphs Young: 3-5% or 150-500 per cu. mm.
Polymorphs Myelocytes: 0% or 0 per cu. mm.
Lymphocytes: 25-33% or 1,250-3,300 per cu. mm.
Monocytes: 0-9% or 0-900 per cu. mm.
Eosinophils: 0-4% or 0-400 per cu. mm.
Basophils: 0-2% or 0-200 per cu. mm.

Film: A description of the red cells is made, noting variation in size (Anisocytosis), in staining (Pallor and Polychromasia), and in shape (Poikilocytosis). A note of the presence of nucleated red cells and of parasites, stippling, etc. is also made.

Total Direct Eosinophil Count: This gives more accurate figures than a W.B.C. and differential count. Normal 0–240 eosinophils per cu.mm.

Blood Screening Test: This consists of the following examinations—

P.C.V.
E.S.R.
Total and differential W.B.C. counts.
Description of the red cells.

It should be borne in mind that in the majority of cases requiring investigation all necessary information can be obtained from a screening test, and that requests for Complete Blood Counts add unnecessarily to the work of the pathology department. When abnormalities are discovered in the screening test, additional examinations may be indicated and will be carried out without further request.

NORMAL VALUES IN INFANTS AND CHILDREN

	Birth	12 Days	3 Months	6-12 Mths.	4-13 Years
R.B.C. in Millions -	4-6	4-5	4-5	4-5	4-5
Hb. in Grams - -	a. Cord Bl. 14-19 b. Capillary Bl. 16-22	Level falling	11	12-13	12.5-14
W.B.C. - -	18,000	14-17,000	12,000	6-10,000	6-10,000
Poly per cu. mm. -	10,000-12,000	Average 4,500	Average 4,500	2,800-7,200	2,800-7,200
Lympho. per cu. mm.	2,000-4,000	9-12,000	Falling	6,000-8,000	1,250-3,300

Nucleated R.B.C. may normally number up to 600-1,000 per million R.B.C. at birth, falling to 25-50 per million R.B.C. at the end of the first week.

INTERPRETATION OF BLOOD COUNTS

RED CELLS

ANAEMIA is indicated by a fall in the haemoglobin level, usually accompanied by a fall in the red cell count. The type of anaemia is indicated by the size (M.C.V.) and colour or haemoglobin concentration (M.C.Hb. Conc.%) of the red cells.

I—Macrocytic Anaemia: This type may be due to—

(1) deficiency of anti-anaemia liver principle. The commonest example of this is "Pernicious" (Addisonian) anaemia. This is usually accompanied by a low reticulocyte and neutrophil count, and a slightly raised icterus index. The diagnosis is confirmed by the presence of megaloblasts in bone marrow films, a histamine-fast achlorhydria and a maximum reticulocyte response following injection of a potent liver extract. Other important anaemias in this group are those found in sprue, idiopathic steatorrhoea, tropical nutritional macrocytic anaemia, macrocytic anaemia of pregnancy, and some cases of carcinoma of the stomach and intestine. (2) Intense bone marrow activity, especially in some haemolytic anaemias. In these the reticulocyte count is usually greatly raised, and no megaloblasts are present in bone marrow smears.

II—Normocytic normochromic Anaemia due to (1) sudden recent blood loss. The leucocyte count and E.S.R. may be increased. (2) Blood destruction, as in acute and chronic haemolytic anaemias. An example is acholuric jaundice. Other blood findings in this disease are the presence of spherocytes, a high reticulocytosis and raised icterus index, and abnormal fragility of the erythrocytes. (3) Aplasia of the bone marrow, due either to known toxins (gold, organic arsenicals, bismuth, exposure to radio-active substances, etc.) or unknown causes. The leucocyte and platelet counts are low, and bone marrow films show very few immature cells. (4) Chronic "toxaemias" as in malignancy, renal disease and chronic sepsis. A leucocytosis and an increased E.S.R. are usually found. (5) Infiltration of the bone marrow with neoplastic or other abnormal cells as in metastatic carcinoma, Hodgkin's disease, leukaemia, multiple myelomatosis, myelosclerosis. The blood may show the characteristic changes of leukaemia or of leuco-erythroblastic anaemia (presence of immature red and white cells). Bone marrow biopsy may show the presence of leukaemia or of neoplastic cells, and X-ray examination of the bones destruction due to metastases. (6) "Banti's disease" (Hypersplenism): leucopenia is usually present.

III—Microcytic normochromic Anaemia due to the same diseases as in group II (4) above. The leucocyte count and E.S.R. are usually raised.

IV—Microcytic hypochromic Anaemia due to (1) deficient diet: low iron content of diet, especially in infants; (2) defective absorption of iron: Achlorhydria is usually present. Also in the presence of chronic diarrhoea. In both these the leucocyte count and E.S.R. are usually normal. (3) Continued blood loss, especially from the alimentary and genito-urinary tracts. A reticulocytosis is usually found, and the leucocyte count and E.S.R. may be raised.

Polycythaemia (increase in R.B.C. and Hb.) may be—

(1) COMPENSATORY, as in conditions interfering with oxygenation of the blood.

(2) SECONDARY in HAEMOCONCENTRATION due to secondary shock or dehydration. There may be a slight associated polymorph leucocytosis.

(3) PRIMARY in polycythaemia vera. There is usually a polymorph leucocytosis.

WHITE CELLS

Increase (leucocytosis) occurs in—

(1) Acute infections—usually a polymorph increase. Over 80% of polymorphs suggests suppuration.

(2) Certain special infections (to a variable degree) such as infectious mononucleosis (in which the lymphocytes and monocytes are increased with abnormal forms) and in whooping-cough in which there is a lymphocytosis.

(3) Leukaemias. There is usually a gross increase, but there may be a normal or even a low count in the subleukaemic types. Young forms of lymphocytes, polymorphs or monocytes are usually present. There is often anaemia. A bone marrow count is usually helpful.

Decrease (leucopenia) usually involves the polymorphs (neutrophils) first. This may be—

(1) PRIMARY, due to marrow aplasia affecting the white cells alone or with aplastic anaemia.

(2) SECONDARY (a) to the toxaemia of certain infections, such as typhoid and abortus fevers; (b) to the toxic effects of certain drugs (e.g. Sulphonamide drugs, gold, thiourea and thiouracil, etc.); (c) to an overwhelming infection —but there are usually young forms of polymorphs present.

Eosinophilia is most often due to parasitic infestations and allergic conditions.

BLEEDING AND COAGULATION TIMES
FRAGILITY TESTS
PLATELET AND RETICULOCYTE COUNTS

These require to be done by a technician at the bedside.

Normal Values are:—

BLEEDING TIME (Ivy's Method): up to 240 seconds.
(Dukes' Method): 1-3 minutes.

COAGULATION TIME (Lee and White's Method): 4 to 10 minutes.
(Dale and Laidlaw's Method): 90-150 seconds.

FRAGILITY OF R.B.C.: Commences 0.45%; complete 0.28% Saline.

PLATELETS: 250,000-500,000. Fonio's method usually gives lower values.

RETICULOCYTES: 0-2.0 per cent of R.B.C.

BASOPHILIC STIPPLING: thin blood films should be sent.

PROTHROMBIN CONCENTRATION. Quick's One-Stage test is used. This is indicated in haemorrhagic diseases, jaundice and for the control of dicoumarol therapy. 5 cc. of oxalated venous blood is required. This should be sent to the laboratory IMMEDIATELY after taking.

Results will be reported as per cent of the normal prothrombin concentration. Percentages between 50 and 100 can be accepted as normal.

BONE MARROW COUNTS. Arrangements for these should be made with one of the Pathologists.

ERYTHROCYTE SEDIMENTATION RATE (E.S.R.)

The method used is that of Wintrobe, and the result is expressed in terms of the distance in millimetres which the red cells have settled after standing one hour. Arbitrarily chosen "grades" are shown below.

E.S.R. in mm.		GRADE	INTERPRETATION
MALE	FEMALE		
0-6	0-15	1	Normal
7-10	16-22	2	Doubtful increase
11-15	23-30	3	Slight increase
16-24	31-39	4	Moderate increase
Above 25	Above 40	5	Marked increase

The observed sedimentation rate and the rate "corrected for anaemia" are reported. A correction for anaemia is generally accepted as advisable, but the methods of doing so are crude. Conclusions should not be drawn from small differences.

The reasons for the variation in sedimentation rate are largely unknown and the test is a non-specific phenomenon. The information given is of a general character as a measure of the presence and intensity of pathological processes, and may be compared with that given by the pulse rate, temperature and so on. It is not diagnostic of any one disease.

In general it is increased in cases of pregnancy, malignant disease and infection. The increase is associated with the degree of tissue injury and so is particularly marked in acute generalised infections, destructive chronic lesions, and tumours undergoing necrotic changes.

It is very important as an indication of the presence of latent disease as it may be increased when most other clinical and laboratory tests are normal. In such a case an exhaustive search for some underlying pathology is essential, and one runs considerable risk in diagnosing functional disease in the presence of a raised sedimentation rate although our knowledge of the phenomenon is not sufficient to enable us to insist that an increased rate invariably indicates disease.

In a woman of child-bearing age a rapid rate suggests pregnancy if an inflammatory or neoplastic condition can be excluded, and vice versa. In pregnancy it commences to rise about the tenth week, reaches a maximum just after parturition, and returns to normal in about one month.

It is particularly useful as a guide to progress and activity of such diseases as myocardial infarction, pulmonary tuberculosis, rheumatic fever and nephritis. A gradual return to normal is a favourable sign, while failure to do so is the reverse and frequently indicates that some complication has arisen. In convalescence the sedimentation rate often remains abnormal longer than other clinical or laboratory findings.

A raised rate indicates infective arthritis rather than osteo-arthritis. Its estimation is of great value in guiding gold treatment in rheumatoid arthritis as it is not only unnecessary, but actually dangerous, to give gold when the sedimentation rate is normal.

SEROLOGICAL TESTS

5-10 cc of whole blood withdrawn by a sterile dry syringe and sent in a plain sterile tube is required for—

Wassermann, Kahn, and Kline Reactions.
Gonococcal and Hydatid Complement Fixation.
Paul-Bunnell test for Infectious Mononucleosis (Glandular Fever).
Agglutination tests in suspected Enteric and Undulant Fevers.

The specimen is to be taken by the Medical Officer, unless a complete blood count is required at the same time, when a technician will take both samples.

For Wassermann, Gonococcal and Hydatid Complement Fixation tests specimens must be in the Laboratory by NOON on WEDNESDAY.

INTERPRETATION OF SEROLOGICAL TESTS FOR SYPHILIS, HYDATIDS and GONOCOCCAL INFECTION.

Results are rendered as Positive, Doubtful (or weakly positive), and Negative, as the older system of notation (++, +±, etc.) may suggest misleading quantitative significance.

"+" (positive) is a reaction which is given practically only by sera from cases of syphilis and in a few well-defined pathological conditions such as yaws, leprosy, acute stage of malaria, infectious mononucleosis, and following vaccination.

"—" is a negative reaction.

"±" (plus over minus) is a doubtful reaction, of value in known cases under treatment, but not diagnostic, and calling for further investigation.

Wherever a positive reaction is reported, in the absence of history or of clear evidence of syphilis, the test should be repeated on another specimen. Anti-complementary reactions are often due to contaminated serum.

The Gonococcal Complement Fixation test is of very little value in diagnosis.

For interpretation of Hydatid Complement Fixation test see page 27.

INTERPRETATION of AGGLUTINATION TESTS

Agglutination by the patient's serum to a titre of 1/100 (O antigen) is suggestive of infection by organisms of the typhoid-paratyphoid group. When previous T.A.B. inoculation has been performed, the interpretation of tests may be difficult and therefore the patient's inoculation history must always be given. A rising titre may be significant and should always be sought.

A titre of 1/120 against Br. abortus suggests past or present infection, but in some cases of brucellosis agglutinins cannot be demonstrated.

In the Paul-Bunnell test for Infectious Mononucleosis the result of a preliminary screen test, if negative, can be given in 24 hours, but the full test takes 48 hours to perform. A titre of 1/160 or over with absorption of antibody by ox-cells is strongly suggestive of infectious mononucleosis.

Agglutination tests in cases of suspected dysentery are of little value.

In some cases of "primary atypical pneumonia" the serum may contain cold agglutinins to a high titre. Titres over 1/64 are diagnostic.

BLOOD CULTURES

These are as a rule taken by a technician. The ward must notify the Laboratory when the temperature of the patient is rising or high, so that the culture may be taken at a suitable time. The patient should be on an hourly temperature chart for this purpose. Medical Officers wishing to take cultures may obtain culture media from the Laboratory.

Cultures are usually examined at 48 hour intervals—a POSITIVE result being reported as soon as found. The first such report would be available at 72 hours. They are kept 10-14 days before a final NEGATIVE is reported.

BLOOD CHEMISTRY

Test	Minimum Volume of Blood required and type of Tube to use.	Normal Values in mgm. per 100 cc	Conditions in which Abnormal Values occur.
Blood Sugar (Glucose)	4 cc Oxalate Tube.	80-110	High: Diabetes Mellitus, occasionally in cerebral conditions. Low: Hyperinsulinism, cretinism and myxoedema, Addison's disease. Before meals in liver dysfunction.
Blood Nitrogen T.N.P.N. Urea N. Urea	6 cc Oxalate Tube.	 25-35 10-20 20-35	High: Nephritis, metallic poisoning, Addison's disease, cardiac failure, intestinal and prostatic obstruction, renal destruction, severe toxic and febrile conditions, dehydration, after severe haemorrhage. Low: Lipoid nephrosis in adults, acute and severe liver insufficiency.
Blood Uric Acid	6-8 cc Oxalate Tube.	2.5-4.0	Level not significant in children. High: Gout, nephritis, leukaemia, remissions in pernicious anaemia, chronic lead poisoning, eclampsia, cardiac failure, intestinal or urinary obstruction. Low: Sometimes in relapses in pernicious anaemia and coeliac disease.

BLOOD CHEMISTRY—*continued*

Test	Minimum Volume of Blood required and type of Tube to use.	Normal Values in mgm. per 100 cc	Conditions in which Abnormal Values occur.
Plasma Chlorides	6 cc Oxalate Tube.	570-620	High: Certain forms of nephritis and Simmonds' disease. Low: Addison's disease, diabetic acidosis, excessive vomiting or gastric suction, prolonged diarrhoea, loss from intestinal or biliary fistulae, and in some acute infectious diseases (e.g. pneumonia).
Plasma CO_2-Combining power	Consult Biochemist.	Adults: 52-80 vols % Children 45-60 vols %	High: Alkalosis, tetany. Low: Acidosis (probably no symptoms until below 40 vols %)
Serum Calcium	10 cc Plain Tube.	9-11	High: Hyperparathyroidism. Low: Hypoparathyroidism, tetany (below 7 mgms.), osteomalacia, coeliac disease, sprue, nephrosis, nephritis, uraemia.
Serum Cholesterol	6 cc Plain Tube.	140-200	High: Diabetes mellitus, nephrosis, glomerular nephritis, biliary obstruction, pregnancy, hypothyroidism, and xanthomatosis. Low: Pernicious anaemia, acute hepatic disease, acute febrile diseases, hyperthyroidism.
Serum Phosphorus	10 cc Plain Tube.	2.5-3.5	High: Hypoparathyroidism, healing fractures, nephritis with uraemia, administration of vitamin D. Low: Rickets, osteomalacia, hyperparathyroidism.
Serum Proteins Total Albumin Globulin A/G ratio	8 cc Plain Tube.	 6-8 3.8-5.5 1.8-3.0 3/2	High: Dehydration, Addison's disease. Low: Nephritis, nephrosis, malnutrition, subacute hepatitis and cirrhosis, severe burns, sometimes in congestive heart failure.
Serum Acid Phosphatase	8 cc Plain Tube.	0.5-3.0 Units.	High: Metastasising prostatic carcinoma.
Serum Alkaline Phosphatase	8 cc Plain Tube.	4-15 Units.	High: Various disorders of bones: biliary obstruction.

Test	Minimum Volume of Blood required and type of Tube to use.	Normal Values in mgm. per 100 cc	Conditions in which Abnormal Values occur.
Van den Bergh Reaction	5 cc Plain Tube.		Direct Reaction indicates obstructive jaundice. Indirect Reaction indicates haemolytic jaundice. Biphasic Reaction indicates both obstructive and haemolytic jaundice and is commonly found in toxic jaundice.
Serum Bilirubin	5 cc Plain Tube.	0.2-0.8	Increased in jaundice. Values between 1 and 2 mgms% occur in subclinical jaundice.
Serum Diastase	5 cc Plain Tube.	4-32 units	Marked increase in acute pancreatitis: for chronic pancreatitis, see "Pancreatic function".
Serum Thiocyanate	20 cc Plain Tube.		In control of thiocyanate therapy, optimum level 9-12 mgms%.
Serum Sodium	6 cc Plain Tube.	315-340	Low in Addison's disease, and in prolonged vomiting. High in excessive saline administration.
Serum Potassium	6 cc Plain Tube.	16-21	High in Addison's disease and acute intestinal obstruction.

ENDOCRINE SYSTEM

BASAL METABOLIC RATE ESTIMATIONS

The requisition sheet should be sent to the Laboratory. An appointment will be made and the ward or out-patient notified of the date and time (usually 8 a.m.).

On the morning of the test the patient must not have anything to eat and possibly only a small glass of water to drink. The patient should not be disturbed, except to empty the bladder before going to the Laboratory. The case notes should accompany the patient and on these must be clearly written the ACCURATELY MEASURED HEIGHT AND WEIGHT. These figures must not be "estimated".

NORMAL VALUES OF B.M.R.:—

Adults ..... + 10% to − 10%
Children ..... + 15% to − 15%

High: Hyperthyroidism, leukaemia and polycythaemia.

Slight Increase: Acromegaly, tumours of adrenal, and sometimes in high blood pressure, especially with early congestive failure.

Low: Hypothyroidism, Addison's disease, Simmonds' disease, severe malnutrition.

GLUCOSE TOLERANCE TESTS

Note: Carbohydrate should **not** be restricted in the diet of patients for 3-4 days before Glucose Tolerance Tests.

A. STANDARD GLUCOSE TOLERANCE TEST

The patient should have nothing to eat or drink after 8 p.m. the night before. The test is started in the morning early by obtaining 5 cc of blood which is placed in an oxalate tube labelled with time and name. The bladder is emptied and a sample of this urine placed in a jar similarly labelled. 50 grams of glucose are given in 100 cc of water by mouth and a further glass of water should be given. For children or small adults the dose of glucose should be 0.8 grams per Kilogram of body weight. The patient should not smoke. Further specimens of **blood** and **urine** are collected ½ hour, 1 hour, 1½ and 2½ hours after the giving of the glucose, and placed in containers labelled with times and name. As soon as the test is completed the specimens are sent to the Laboratory.
Results: Normal fasting blood sugar 80-110 mgms. The peak of the blood sugar curve should occur with the first hour and not exceed 160-170 mgms. The curve should return to normal in 1½-2 hours. These values may be raised in old age and lowered in infancy. There should be no glycosuria.

B. PROLONGED GLUCOSE TOLERANCE TEST

Tests continued to four to six hours after the ingestion of glucose can be carried out. These are of use in the investigation of cases of hypoglycaemia.

C. EXTON ROSE TEST (One hour, two dose test):

For routine use this has been replaced by the standard test.

INSULIN TOLERANCE TESTS

Blood sugar values are determined after the subcutaneous injection of 0.1 units insulin per Kgm. ideal body weight. This test is useful in the diagnosis of pituitary hypofunction and in adrenal cortical insufficiency. The test is usually carried out in the Pathology Department and details can be obtained from the Biochemist.

ADRENAL FUNCTION—Robinson, Power & Kepler's (1941) Test for Addison's Disease.

Details of the technique may be obtained from the biochemical laboratory.

The first part of the test is based on the fact that patients with Addison's disease do not develop a normal prompt diuresis after ingestion of large amounts of water. The second part is based on calculation of a "Factor A" from studies of blood and urine chemistry. When the value of Factor A is more than 30 Addison's disease is unlikely. A value of less than 25 makes the diagnosis of Addison's disease probable, if nephritis can be excluded.

17-KETOSTEROIDS (URINARY)

This estimation is done on a 24-hour collection of urine (for special conditions consult Biochemist). Normal values for sex and age are indicated on each report. The estimation is useful in the diagnosis of adrenal tumour and hyperplasia, hirsutism, Addison's disease, hypo- and hyper-pituitarism (Cushing's Syndrome).

SPECIAL ENDROCINE TESTS

These are being added from time to time. For any special investigation, the Biochemist should be consulted. It is hoped that estimations of urinary corticosteroids, pregnanediol and gonadotrophins will be available shortly.

MISCELLANEOUS

TISSUES FOR HISTOLOGICAL EXAMINATION

Specimens should not be cut in any way so that an accurate macroscopic description may be made. From the theatre tissues may be sent unfixed: but if there is likely to be any delay, longer than 6 hours, before they can be examined they should be fixed in TEN TIMES THEIR VOLUME of 10 per cent FORMALIN. Minute BIOPSY SPECIMENS (e.g. from bronchoscopy) are best placed immediately in 10 per cent formalin to prevent drying: such biopsies should never be sent on gauze or cotton wool.

Tissues from outside hospitals and doctors are dealt with as follows: Small pieces are sent in well-sealed bottles with 10 times their bulk of 10 per cent formalin. The bottle must be surrounded by absorbent material and enclosed in another container. Large tissues and organs are best fixed for several days in 10 times their bulk of 10 per cent formalin, then washed, wrapped in damp cotton wool and waterproof material and sent as a parcel. If the time in transit is to be only a few hours, organs (e.g. breast, stomach, colon) may be wrapped in greaseproof paper or damp gauze and sent unfixed.

Results: In the case of tissues received by 4 p.m. and not requiring special treatment (e.g. decalcification or special stains), a result is normally available (on request) in the late afternoon of the day following receipt of the tissue. If the form is marked urgent an effort will be made to communicate the result as soon as available. By special request a more rapid report can be made and the Papanicolaou smear technique is available in certain cases for cytological reports. Upon request, a Pathologist will attend the theatre to give an opinion on naked eye appearances.

PUNCTURE FLUIDS (pleural, peritoneal, synovial).

Samples of these should be sent in (*a*) A sterile test tube one third full, and (*b*) An oxalate tube as for blood counts (not more than 5 cc). In certain cases it may be advisable to send the whole volume of aspirated fluid for concentration, e.g. for T.B.

Search for neoplastic cells in aspirated fluids by the Papanicolaou technique is a useful diagnostic measure.

PUS: Specimens may be sent in a sterile test tube (not more than one third full) or on a throat swab. If the amount of pus is small thin smears should be made on clean glass slides which should be sent with the swab. If tuberculosis is suspected send a quantity of pus in a tube rather than a swab.

VITAMINS

Test for Vitamin C Deficiency: After emptying the bladder the patient is given 4 mgms per pound body weight of Vitamin C (ascorbic acid). The urine is collected for the next 24 hours. As each specimen of urine is obtained

1 cc of glacial acetic acid is immediately added to every 10 cc of urine. The urine should be kept in a cool dark place (preferably a refrigerator). When the whole 24 hours urine has been collected it is thoroughly mixed, measured and a sample of 100-200 cc sent to the Laboratory with the requisition sheet on which must be shown the volume of the 24 hour urine.

Results: An excretion of under 13-15 mgms of Vitamin C per 24 hours is indicative of some Vitamin C deficiency.

SKIN TESTS

SHICK TEST for susceptibility to Diphtheria.

An intradermal injection is made into the forearm of 0.2 cc Diphtheria Toxin. A control may be done using a similar injection of toxin that has been heated to 90° for 10 minutes. A positive reaction consists of an area of redness and infiltration appearing 24 to 36 hours after the injection and maximal on the fourth day. It fades slowly often with scaling and pigmentation. The control should be negative or may produce an early rapidly fading redness.

Interpretation: If there is no reaction on the fourth day the patient may be considered insusceptible to Diphtheria.

DICK TEST for susceptibility to Scarlet Fever.

An intradermal injection of 0.1 cc Dick Test Toxin is made into the forearm. A similar injection of Dick Test Control is made into the other forearm. A positive reaction consists of an area of redness and induration 5 to 30 mm in diameter maximal within 24 to 48 hours. Reaction to the control injection must be "subtracted" from the reaction to the toxin in reading the result.

Interpretation: A negative reaction indicates a considerable degree of immunity against Scarlet Fever.

SCHULTZ-CHARLTON REACTION for the diagnosis of Scarlet Fever.

An intradermal injection of 0.2 cc of 1 in 10 dilution of Scarlet Fever Streptococcus Antitoxin is made into an area of skin showing the rash. If blanching of the rash occurs at the site of injection within 12 to 24 hours it is evidence that the disease is Scarlet Fever. But if no blanching occurs no information is gained, i.e. a positive result only is of value.

SKIN TESTS for susceptibility to Tuberculosis.

(A) **MANTOUX TEST:** This may be done using either Old Tuberculin (O.T.) or the Purified Protein Derivative (P.P.D.).

Using O.T. The first dose consists of an intradermal injection of 0.1 cc of 1 in 1,000 dilution. A positive reaction shows an area of erythema and infiltration at least 5 mm in diameter within 48 to 96 hours.

If there is no reaction after 48 hours a second injection of 0.1 cc of 1 in 100 dilution is given, followed by a third of 0.1 cc of 1 in 10 dilution, before a negative result is recorded.

Using P.P.D. Doses of 0.1 cc containing 0.00002 mgm and 0.005 mgm are used in a similar manner.

(B) **PATCH TEST.** The material used consists of discs of filter paper saturated with Tuberculin, and attached to adhesive plaster.

An area of soft skin is selected (medial aspect of arm, back near upper spine, or sternum) and cleaned with acetone or ether. Two patches should be applied and firmly pressed on. They are left for 48 hours, the wetting of them being avoided.

A positive reaction consists of a miliary eruption where the paper has been in contact with the skin—varying from a few minute papules to a raised red area, which may spread beyond the area covered by the paper. It must be distinguished from reaction to the sticking plaster.

Interpretation. Positive reactions indicate past or present infection with tubercle bacilli.

SKIN TESTS for **ALLERGENS** in conditions such as Hay Fever, Asthma, Urticaria, Eczema, Angio-neurotic Oedema are made by appointment. A detailed history of the disease, including family and past history and notes of possible allergens must accompany the requisition.

TESTS FOR HYDATID DISEASE

(1) CASONI TEST

An intradermal injection of 0.25 cc (or sufficient to raise a wheal 1 cm in diameter) of Hydatid Fluid is made into the forearm. A control injection of normal saline is also made.

The **Immediate Reaction** develops within 30 minutes and is positive if the wheal measures at least 2.4 cm in one diameter or 2.2 cm in both diameters. Doubtful reactions show wheals with both diameters from 2.0 to 2.2 cm or one diameter between 2.2 and 2.4 cm. Smaller measurements are shown in a negative response.

The **Delayed Reaction** of erythema and induration may develop in some hours and persist for 24 hours. It is positive if the area of induration and oedema is at least 4 cm in diameter.

Interpretation: The test is positive in 75 per cent of uncomplicated or degenerate cysts. It is about 100 per cent positive in recent rupture or suppuration of a cyst. It remains positive for many months or years after complete removal of cysts. False positives may be given by other cestodes, sensitivity to sheep protein or other allergic conditions.

(2) HYDATID COMPLEMENT FIXATION (see page 20)

Positive in about 50 per cent of uncomplicated cysts. Almost 100 per cent positive in recent rupture or suppuration. The test becomes negative some months after the destruction of the cyst by suppuration, rupture or operative removal.

N.B. Remember that the two tests are only positive when hydatid fluid has entered the circulation from a leaking cyst. Hence cysts may frequently be present in the brain or lungs (especially in children) with negative Casoni and complement fixation tests.

HYPERSENSITIVITY TO SERUM

(Detection, Prevention and Treatment)

MANIFESTATIONS OF HYPERSENSITIVITY

1. Naturally occurring in various ALLERGIC CONDITIONS (asthma, hay fever, urticaria, eczema, etc.). Horse asthmatics are particularly liable to reactions when given injections of serum derived from horses.
2. Acquired following the injection of SERUM.

   (a) The hypersensitivity may be LATENT, but reveals itself as a reaction to a subsequent injection of serum.

   (b) SERUM SICKNESS. Some patients develop this condition after the first or subsequent injections of serum. It is more likely to follow the use of serum derived from the horse and less likely to occur when concentrated or refined serum is used. It may develop from 2 hours to 24 days (usually 8-12 days) after the injection. Early reactors have often had a previous injection.

Symptoms. Rashes (usually urticarial and often showing first at the site of injection): fever: joint pains and stiffness (in the jaw joints the latter may simulate trismus): oedema: enlargement of lymph nodes. "The illness is variable in duration, protean in its symptoms and seldom of a serious nature—probably never fatal."

Treatment. Use adrenalin 1 in 1000 in doses of 0.5-1.0 cc subcutaneously or intramuscularly depending on severity of symptoms. Atrop. Sulph. gr. $\frac{1}{50}$ subcutaneously.

(c) ANAPHYLACTIC SHOCK. In a minority of cases the patient soon becomes restless, anxious and may cry out. Pallor, sweating, tachycardia, dyspnoea, coma, rigors and convulsions may follow. Death may occur fom respiratory failure. This condition is more likely to occur in persons who are horse asthmatics or when serum is given quickly intravenously or intrathecally.

Prophylaxis. Atrop. Sulph. gr. $\frac{1}{100}$ subcutaneously 30 minutes before injection of serum. Have syringe containing 1 cc $\frac{1}{1000}$ adrenalin ready for use.

DETECTION OF SENSITIVITY

A test for sensitivity is not necessary before intramuscular or subcutaneous injection of serum unless there is a suspicion of sensitivity to horse protein (e.g. in a horse asthmatic).

A test is indicated before intravenous or intrathecal use of serum when the patient is known to have had serum previously, and before serum is given by any route to a horse asthmatic.

TEST. Make dilutions in saline of normal horse serum (or the immune serum to be used) of 1 in 5 to 1 in 50 depending on the degree of sensitivity suspected. Inject 0.1 cc of the diluted serum intradermally to raise a small white wheal. Control with saline.

Positive. An urticarial wheal develops in 5-10 minutes reaching a maximum in 1 hour and fading in a few hours.

Negative. The wheal disappears in a few minutes in an insensitive subject.

DESENSITISATION

This is advisable when serum is to be given:—

(1) For the first time intravenously.

(2) Intravenously or intrathecally to a person who has had serum before.

(3) By any route, and whether for the first time or not, to an allergic subject, especially a horse asthmatic.

(4) To a patient with serum sickness.

Desensitisation is not required:—

(1) When the patient is not allergic, has never had serum before, and when serum is to be given by routes other than the intravenous.

(2) When the patient is not allergic but has had serum before and the injection is to be either subcutaneous or intramuscular.

METHOD

(1) When the patient is not allergic and the skin test (as above) is negative a simple safety measure is to give 1 cc serum subcutaneously 1-2 hours before the intravenous or intrathecal injection, which should in any case be slow. When the patient is not allergic but has a positive skin test this method suffices before an **intramuscular** injection.

(2) When serum is to be given **intravenously** to a non-allergic subject with a positive skin sensitivity test, the following is done: give a subcutaneous injection of 0.025 cc serum followed by subcutaneous injections at 30 minute intervals of 0.05, 0.1, 0.2, 0.4 and 1.0 cc serum.

If there is a reaction after any dose repeat or reduce dose depending on severity of reaction. If there is no reaction after 1.0 cc start intravenous injections with 0.1 cc doubling the dose half hourly. If a general reaction (cyanosis, dyspnoea, tachycardia, etc.) develops, wait 2-4 hours and repeat same dose. After 25 cc has been given in these small doses give 50 cc 4 hours later and in 6-8 hours the full dosage of serum.

N.B. Such desensitisation may last only for 8 hours to some days.

(3) In the case of a horse asthmatic make preliminary skin tests (intradermal) with dilutions of serum 1 in a million up to 1 in 100. Then give a subcutaneous injection of 0.1 cc of the highest dilution which failed to produce a skin reaction. Gradually increase dosage at weekly intervals.

LABORATORY AND OTHER TESTS OF IMPORTANCE IN ESTABLISHING DIAGNOSIS AND MEASURING PROGRESS OF COMMON DISEASES

CARDIO-VASCULAR

Rheumatic Carditis: E.S.R. (increased)
W.B.C. (increased in acute phase)
Electrocardiograms.

Bacterial Endocarditis: W.B.C. (increased). Hb (reduced). E.S.R. (increased).
Repeated blood culture (when temperature rising).
Urine (R.B.C. intermittently. Sometimes casts present).

Myocardial Infarction: W.B.C. (increased 12-24 hours after onset. Persistence after several days is a bad prognostic sign).
E.S.R. (increased).
B.P. (reduced).
Electrocardiograms.
Serum cholesterol (young patients).

Hypertension: B.P. (repeated readings). Basal B.P. in doubtful cases.
Urine (albumin and casts, specific gravity R.B.C.).
Renal function tests.
Retinal changes.

RESPIRATORY

Pneumonia: W.B.C. (increased, or a "shift to the left". Normal or low in virus pneumonia).
Urine chlorides (low).
Sputum (organisms).
Blood culture sometimes useful.
X-ray.

Lung Abscess: W.B.C.
Sputum (pus and organisms).
X-ray.
Exploratory puncture.

Empyema: Sputum (pus and organisms).
Fluid (pus and organisms).
X-ray.
Exploratory puncture.

Pleurisy: Fluid (cytology, organisms, animal inoculation, glucose).
E.S.R.
W.B.C.
X-ray.
Exploratory puncture.

Pulmonary T.B.: Sputum, six specimens.
Laryngeal swab for culture.
Gastric contents (fasting specimen).
E.S.R.
W.B.C.
X-ray.

Asthma: W.B.C. (eosinophilia).
E.S.R. (normal).
Skin tests.
Sinuses (X-ray).
Sputum (eosinophilia, Charcot-Leyden crystals, Curschmann's spirals).

Carcinoma: Sputum or pleural fluid for neoplastic cells.
E.S.R.
X-ray.
Bronchoscopy.

ALIMENTARY

Indigestion, Peptic Ulcer, Gastric Carcinoma: X-ray—Barium meal.
X-ray—Graham's test.
Gastric analysis.
Stools (occult blood).
Complete blood count.
Resting juice for cytology.

Pancreatitis—Acute: Serum or urine diastase
W.B.C. (increased).
Loewi's test.
Blood sugar (transient rise).

Pancreatitis—Chronic: Faeces, microscopic and chemical examination for—
Muscle fibres.
Tryptic activity.
Fat.
Urinary diastase test on a 24-hour specimen.
Glucose tolerance test.
Duodenal intubation.

Enteric Fevers: W.B.C. (normal or low).
Blood culture (as long as temperature raised, especially in first week).
Stool culture (all periods, especially second and third weeks)
Urine culture (third week).
Agglutination tests (second week with repetition for rising titre).

Dysentery—Bacillary: Macroscopic appearance stool.
Stool for exudate and culture.
W.B.C. (increased early).
Sigmoidoscopy in chronic cases (swab ulcer).

Dysentery—Amoebic: Six warm stools for amoebae.
Stools for cysts (no oily purgatives).
E.S.R.

Enteritis and Colitis: Direct and cultural examination of stools.
Complete blood count.
Agglutination tests.

LIVER

Acute Hepatitis, Necrosis, or Catarrhal Jaundice: W.B.C. (normal or low).
Urine—Urobilin increased early.
Bile salts present early.
Later, bile pigment present.
Serum bilirubin, thymol turbidity, colloidal gold and alkaline phosphatase.
Faeces for stercobilin (return is early sign of recovery).

Sub-Acute Necrosis, Chronic Hepatitis or Cirrhosis: W.B.C.
Serum colloidal gold, thymol turbidity, alkaline phosphatase and bilirubin.
Plasma proteins (total, and albumin and globulin fractions).
Bromsulphalein retention.
Fasting blood sugar.
Prothrombin time.

Amoebic Hepatitis: W.B.C.
Stool for amoebic cysts.
Serum bilirubin.
E.S.R.
X-ray liver.

Jaundice: Blood count.
Serum: thymol turbidity, alkaline phosphatase, bilirubin, etc.
Urine: urobilin and bilirubin.
Faeces: stercobilin (qual. and quant.)
Casoni test.
Serum H.C.F.
Prothrombin concentration.

GENITO-URINARY

Nephritis: Blood pressure.
W.B.C. and E.S.R.
Urine. Daily volume.
S.G.
Albumin (quantity).
R.B.C. and casts.
Throat swabs for streps in acute infection.
T.N.P.N.
Renal function—Addis Fishberg test.
Urea clearance test.
Serum proteins.
Plasma chlorides.

Pyelitis and Cystitis: Urine. Reaction.
Albumin.
Deposit—pus cells.
Culture (catheter or midstream specimen).
W.B.C. (increased).

Carcinoma Prostate: Serum acid phosphatase.
Sterility: Seminal fluid.
Endometrial Biopsy.

HAEMOPOIETIC

Anaemias: Complete blood count. For common types see page 17.
When atypical or of ill-defined origin, further investigation includes
Sternal puncture.
Fragility test and reticulocyte count.
Stools for occult blood and stercobilin.
Renal function tests.
Blood cultures (endocarditis).
Wassermann reaction.
B.M.R.
Test Meal.
X-ray bones (in erythroblastic types).

Haemorrhagic Tendencies: C.B.C. (for leukaemia).
Hess' Capillary Resistance Test (clinical test).
Platelet count if resistance test positive.
Bleeding time (normal in haemophilia, increased in purpura).
Coagulation time (normal in purpura, increased in haemophilia).
Prothrombin concentration.

Eosinophilia: Suggests—
(1) Hydatid (Casoni and hydatid complement fixation tests).
(2) Other parasites—Intestinal worms.
Filariasis.
Schistosomiasis.
(3) Allergy—skin tests.

CENTRAL NERVOUS SYSTEM

Cerebral Tumour: W.B.C. (to eliminate abscess).
Optic fundi and fields.
C.S.F. (if no papilloedema).
Wassermann reaction.
Casoni test.
Hydatid complement fixation.
B.P.
Manometric pressure.
Queckenstedt's test.
X-ray skull and lungs.

Meningitis: W.B.C.
C.S.F.

Poliomyelitis, Encephalitis: W.B.C.
C.S.F.

Concussion and Compression: Pulse (half-hourly).
B.P.
Pupils.
C.S.F.

Epilepsy: Pitressin test.

OSSEOUS AND ARTICULATORY

Osteomyelitis: W.B.C.
Blood culture.

Arthritis: W.B.C. (local or focal sepsis).
E.S.R.
Anaemia.
Gastric analysis.
Focal sepsis.
X-ray.
Check gold therapy by monthly urine and blood examinations.

Gout: Blood uric acid.
X-ray.
Microscopical examination tophi.

Bone Tumours, Osteo-Dystrophies, Secondary Deposits:	Serum alkaline and acid phosphatase. Serum calcium and phosphate.

ENDOCRINE

Hyperthyroidism: (Thyrotoxicosis)	B.M.R. (high values). Serum Cholesterol (low values).
Hypothyroidism:	B.M.R. (low values). Serum Cholesterol (high values).
Hyperpituitarism: (Cushing's Syndrome) (Basophilism)	Urinary corticosteroids (raised). Urinary ketosteroids (sometimes raised). Blood lymphocyte and eosinophil cell count (diminished). Urinary uric acid/creatinine ratio (increased). Calcium and nitrogen balance (negative).
(Acromegaly) (Acidophilism)	Urinary ketosteroids (raised in active stage). Urinary corticosteroids (sometimes raised). Calcium and nitrogen balance (positive).
Hypopituitarism: (Simmonds' Disease)	Urinary ketosteroids (very low). Urinary corticosteroids (very low). Eosinophil response to I.V. adrenalin or I.V. A.C.T.H. B.M.R. (low values). Glucose tolerance curve (slow rising curve). Fasting blood sugars (low). Insulin tolerance test (dangerous owing to insulin sensitivity).

Adrenal Cortical Insufficiency:
As above, but distinguished by absent eosinophil response to I.V. adrenalin or I.V. A.C.T.H., and also by Robinson, Power, Kepler Test, and low serum sodium and plasma chlorides.

Adrenal Cortical Tumour: Urinary ketosteroids and corticosteroids (may be increased).

Hyperparathyroidism:	Serum calcium (high). Serum phosphate (low). Serum alkaline phosphatase (high). Serum acid phosphatase (normal). Calcium balance (negative). Plasma chlorides. Plasma T.N.P.N. (normal unless renal involvement).
Hypoparathyroidism:	Serum calcium (low). Serum phosphate (high). Serum alkaline phosphatase (low). Calcium balance.

Diabetes: Fasting blood sugar.
Urine sugar and acetone.
Glucose tolerance test.

Hyperinsulinism: Blood sugar in attack.
Prolonged glucose tolerance test.

GENERAL

Shock and Haemorrhage: Pulse, B.P., Hb. or P.C.V. } all to be frequently repeated.

Dehydration: Hb. or Packed Cell Volume.
Plasma or urinary chlorides.
Plasma proteins.

Coma: Urine for sugar, ketone bodies, albumin, casts, blood.
Blood sugar.
Plasma CO_2 combining power.
T.N.P.N.
Consider alcohol, CO or other poisons.
Blood count and culture in febrile cases.
Tests for dehydration.
Examination of optic fundi.
C.S.F.

PYREXIA OF UNKNOWN ORIGIN

Major continued fevers (102°F or more for 3 weeks or longer):	Minor continued fevers 100°F or less:	Periodic fevers:
Acute tuberculosis.	Chronic tuberculosis.	Malaria.
Septic endocarditis.	Chronic septic conditions.	Hodgkin's disease.
Typhoid and paratyphoid fevers.	B. Coli infections.	Undulant fever.
Acute rheumatism.	Hyperthyroidism.	
Acute septic conditions.	Severe anaemia.	
Artefacts.	Prostatitis.	
	Renal carbuncle.	
	Carcinomatosis.	

Investigations indicated:

Complete blood count and blood films for malaria, etc.

Blood culture (positive only of value) early in disease or during pyrexial attacks.

Agglutination reactions 2nd week and repeat as indicated.

Examination of urine—R.B.C., pus or organisms.
Sputum—organisms.
Joint fluid—organisms.
Stools—organisms.
Biopsy of enlarged lymph nodes.

THROAT INFECTIONS

Swab for direct examination and culture for:—

Diphtheria.
Vincent's Angina.
Streptococci, etc.

W.B.C. (to exclude agranulocytosis, leukaemia, infectious mononucleosis).
If lymphocytosis or monocytosis, do Paul-Bunnell test.
Wassermann reaction.

BLOOD BANK

(INTRAVENOUS UNIT)

This section of the Pathology Department maintains the BLOOD BANK, issues Fluids for Intravenous Infusion, and Sets for giving, cutting-down, and venesection. Between 9 a.m. and 5 p.m. issues are made direct from the unit. After 5 p.m. application should be made to the technician on duty. Small stocks of crystalloid solutions will be issued to the wards and may be replenished as used. All requisitions should be made on the special form.

BLOOD BANK. Blood is obtained by the staff of the unit from VOLUNTARY DONORS of the Canterbury Branch of the National Blood Transfusion Society, from patients with essential hypertension and from relatives of patients receiving blood.

An endeavour should be made by each Medical Officer to obtain blood from friends and relatives of their patients and from patients under their care requiring venesections. Friends, relatives and walking patients for venesection may be sent to the Blood Bank by appointment. Sterile venesection sets will be issued for bleeding of bed patients. Aseptic precautions must be used, a test tube of clotted blood sent with the bottle, and the bottle must be kept in a refrigerator if not sent immediately to the Bank.

APPLICATIONS FOR BLOOD. 5 cc of whole blood in a sterile tube must be sent with the requisition form. Blood should be sent in capillary tubes if venepuncture is not successful or possible.

On the requisition form the Medical Officer should note any previous reactions or any history suggestive of Rhesus incompatibility. The time at which it is desired to give the transfusion should also be clearly indicated.

EMERGENCY TRANSFUSIONS

If it is not possible to wait for grouping and crossmatching before it is necessary to start resuscitation, it is preferable to start with plasma to restore

the blood volume, following with properly cross-matched blood. In rare cases it is permissible to use Group O blood without cross-matching, remembering that in the case of females below and in the child-bearing age whose Rhesus group is unknown or negative only Rhesus negative O blood may be safely used. The same precaution should be applied in the case of recipients of previous transfusions of unknown Rhesus group.

ISSUES OF BLOOD AND PLASMA. Except in cases of emergency no blood or plasma is to be taken from the bank except with the permission of one of the I.V. Unit technicians. A receipt must be given.

After Hours issues of blood and plasma will be made by the Resident Technician. If the technician cannot be found the Medical Officer must himself select the blood which has been previously cross-typed for his patient or take group O blood or plasma. The appropriate details must be entered on half of the label on the bottle and this half detached and left on the spike provided.

ON NO ACCOUNT must a NURSE take either BLOOD or PLASMA from the BANK.

FLUIDS issued by the Unit are:—

BLOOD (400 cc blood with 100 cc citrate solution). Stored or Fresh.
CONCENTRATED RED CELLS, i.e. blood as above less supernatant plasma.
WET PLASMA or SERUM.
DRIED PLASMA, which may be reconstituted to normal or increased protein concentration.
NORMAL SALINE SOLUTION.
FIVE PER CENT GLUCOSE in distilled water.
BARTS SOLUTION (4 per cent glucose with 0.18 per cent sodium chloride).

In each case the slip attached to the bottle must be filled in and left on the spike. The same applies to sterile sets for giving, cutting down and venesection.

RETURN OF APPARATUS. All apparatus must be returned between 9 a.m. and 5 p.m. and handed to a technician for checking. Blood bottles should not be washed after transfusion: they should be returned to the Bank containing the remains of the blood, which may be of value for checking possible reactions.

BLOOD GROUPS

The practice in this Hospital is to use the International system of nomenclature, the groups being named: AB (universal recipient), A, B, and O (universal donor).

A SPECIMEN of 5 cc of whole blood in a plain sterile test tube will provide both cells for grouping the patient and serum for cross-grouping patient with donor. When blood cannot be obtained from a vein, two or three capillary tubes filled from a finger prick and sealed may be sent.

Except in emergencies, when Group O (universal donor) blood may be used, it is desirable to—

(1) Use a donor of the same group as the patient;

(2) Match (cross-group) the cells and serum of the patient with those of the donor. Cross-grouping will eliminate incompatibility due to rare serum agglutinins of high titre and unusual types and to the Rhesus factor.

If necessary, while waiting for cross-matching to be completed, start the transfusion with plasma. Rarely group O blood may be used without cross-matching (but see under Rhesus factor).

THE RHESUS FACTOR

Besides the agglutinogens of the ABO system, all human red blood cells contain another set of agglutinogens distributed independently of the former system. These are known as Rhesus, or Rh agglutinins, and may be further subdivided into a positive type, present in 85 per cent, and a negative type, present in 15 per cent of Europeans. An Rh positive person carries one or more of the genes CDE, D being the most prevalent, while a negative person carries only the genes cde. Agglutinins corresponding to these agglutinogens do not occur in normal sera but are formed as a result of immunisation with Rh positive (or very rarely, Rh negative) blood. The gene D gives rise to most cases of immunisation, and therefore anti-D is the commonest antibody found. Such immunisation may occur, and anti-Rh agglutinins may be abnormally developed: (1) following transfusion of Rh positive blood to a Rh negative recipient. Immunisation may follow the giving of extremely small single quantities of blood (as in intramuscular haemo-therapy). Reactions may occur if further quantities of Rh positive blood are given to patients who have become so immunised. (2) By the Rh negative mother of an Rh positive foetus; this may result in a reaction if the mother is transfused with Rh positive blood, or the life and health of the foetus may be endangered as the result of destruction of its own Rh positive cells by the mother's antibodies. An affected foetus may be still-born, hydropic or macerated; an infant born alive may develop haemolytic disease or if surviving, mental deficiency and spastic paraplegia. As a rule, at least two pregnancies are required to produce immunisation UNLESS THE MOTHER HAS BEEN PREVIOUSLY IMMUNISED BY THE TRANSFUSION OR INJECTION OF INCOMPATIBLE (RH POSITIVE) BLOOD.

Rh testing is undertaken to prevent the occurrence of immunisation by the Rh agglutinogens and of reactions due to the agglutinins developed in this process. It is chiefly used in transfusion and obstetric work as follows:

(1) TRANSFUSION. Only Rh negative blood should be given to Rh negative patients. In particular it is ESSENTIAL to give Rh negative blood to all Rh negative female patients below or in the child-bearing age, to prevent immunisation which might harm any subsequent offspring. Rh negative blood must also be given to any Rh negative patient who has had a previous transfusion, as he may have been immunised, and thus be prone to suffer a transfusion reaction. In the case of unexplained transfusion reactions, the recipient's serum should be examined for the presence of Rh antibodies.

(2) All women should be Rh tested when they become pregnant, so that in case of emergency (especially during labour) they can be transfused with the correct type of blood. In order to determine if a pregnant woman has

become sensitised to the Rh factor, her serum should be examined for the presence of antibodies. If this test is positive, this is important, as it usually indicates that the present foetus in utero will be affected, and preparations for treatment can be made at an early stage. The treatment of affected infants is by means of transfusion with Rh negative blood of the appropriate ABO group. Tests for Rh antibodies in the blood of Rh negative women should be made at least twice during pregnancy: one at the first attendance at the ante-natal clinic; the other about six weeks before the expected date of delivery.

RHESUS FACTOR SUMMARY

(1) IN TRANSFUSION: The aim is to Rhesus group all recipients. It is ESSENTIAL to Rhesus group all females below and in the child-bearing age before transfusion and all persons previously transfused.

(2) IN OBSTETRICS:

(a) Mother: Rhesus group all pregnant women at first attendance; if Rhesus negative, antibodies are looked for in the serum; repeat six weeks before term. Note that absence or low titre of antibodies is no guarantee of absence of haemolytic disease in the foetus or infant.

(b) Father: If Mother is Rhesus negative, the Father should be tested. If he is negative, Rhesus incompatability is practically impossible. If he is positive he should be geno-typed or his parents or other offspring Rhesus grouped to determine whether he is homo- or heterozygous; if the former, all his offspring will be Rhesus positive; if the latter, only fifty per cent will be.

(c) Infant: When haemolytic disease is suspected before or after birth—

(*a*) Send 5 cc cord blood for Coombs' Test, ABO and Rhesus grouping.

(*b*) Send 5 cc cord blood (in oxalate bottle) for Haemoglobin concentration, plasma bilirubin, and film for nucleated red cells. Signs of severe disease are: Hb. below 14 grams per cent, plasma bilirubin above 3 mg. per cent and more than 10 nucleated R.B.C. per 100 leucocytes. Transfusion of Rhesus negative blood is then indicated.

When the infant is first seen later its venous or capillary blood may be tested in the same way, it being remembered that capillary or venous haemoglobin levels are not reliable as a guide to treatment, the necessity for which should be based on clinical findings (strength of feeding, liveliness, etc.). The blood of the infant should be kept under observation for some weeks.

REACTIONS OF INCOMPATIBILITY. These may occur when blood of the wrong ABO group is given or when Rhesus positive blood is given to a Rhesus-negative patient who has developed Anti-Rh Antibody in his or her serum.

THE SYMPTOMS of such a reaction may be tingling sensations; pains in chest, neck or back; precordial compression; dyspnoea; vomiting; rigors. Shortly there may be haemoglobinuria and jaundice, and later anuria. Rigors alone are usually due to pyrogens, or to too rapid a rate of transfusion. When they occur slow the rate of transfusion and observe closely for evidence of reaction due to incompatability.

CONFIRMATION of such reaction should always be attempted by checking of blood groups (return unused blood to blood bank), and by sending a sample of patient's blood for evidence of intravascular haemolysis and jaundice. The urine passed subsequently should be examined for pigment, albumin, casts, and cells.

TREATMENT OF INCOMPATIBLE TRANSFUSION REACTION

The risk of such a reaction is not sudden death but oliguria or anuria and subsequent uraemia. Death is usually due to acidosis, with accompanying abnormalities of electrolyte metabolism. Treatment is in three phases:—

(1) Immediate: stop transfusion and investigate to establish incompatability. Transfuse with compatible fresh blood to relieve shock and anaemia and so lessen possible further anoxic damage to kidneys.

(2) Make frequent observations of plasma CO_2 combining power, chlorides, sodium, potassium, etc., giving appropriate solutions (M/6 sodium lactate, normal saline, Barts Solution, etc.) to control electrolyte balance and acidosis. Total daily fluid-intake should not much exceed 1000 cc plus urinary and other output.

(3) If recovery is to occur, at about 10-14 days a diuresis will develop, with probable severe loss of sodium chloride. It may be necessary to replace this electrolyte.

USES OF BLOOD AND PLASMA

I.—IN HAEMORRHAGE AND SECONDARY SHOCK

In ACUTE HAEMORRHAGE there is sudden diminution of blood volume relative to the size of the vascular bed. This results in a FALL of BLOOD PRESSURE. The body attempts to restore the blood volume by withdrawal of tissue fluid from the interstitial compartment: this process is slow and some hours elapse before dilution of the blood by tissue fluid can be detected by Red cell, Haemoglobin or P.C.V. estimations. These are useless in the early stages as the blood remaining in the vascular bed is normal.

Acute Haemorrhage is often complicated by Secondary Shock with peripheral vaso-dilatation, stagnation and loss of fluid into the tissues. This loss may balance the tendency of tissue fluid to dilute the blood, and hence R.B.C., Hb., and P.C.V. values may be misleading. Therefore in acute haemorrhage and shock, blood pressure and pulse rate readings (repeated half-hourly) are the best guide to the condition of the patient. In rare cases intense peripheral vaso-constriction may maintain the B.P. This state is unstable, characterised by skin coldness and especially pallor. When the patient is warmed or anaesthetised, collapse may ensue.

In SECONDARY SHOCK not due to haemorrhage—i.e. following trauma, operation or burns, etc., there is peripheral vaso-dilatation and loss of fluid into the tissues. This results in FALL of BLOOD PRESSURE and HAEMO-CONCENTRATION as revealed by rising R.B.C., Hb., and P.C.V. values. The P.C.V.

(or Packed Cell Volume) is the proportion of R.B.C. to whole blood revealed when a sample of blood is centrifuged in a haematocrit.

The diagnosis of SHOCK is confirmed and its severity gauged by readings of Blood Pressure and Pulse Rate, and by estimations of R.B.C., Hb., or P.C.V.

The following table gives an approximate estimate of the deficiency in blood volume and its effect on Blood Pressure:—

Degree of Shock	Systolic B.P.	Pulse	Minimum Blood Vol. Deficiency
Mod.	95+	90-110	2 Pints
Severe	60-90	120-140	3+ Pints
Dangerous	Less than 60	120-160	4++ Pints

TREATMENT:

(1) **Blood.** As shock is usually due to haemorrhage, blood is the fluid of choice. Blood should always be cross-matched before being given. In emergencies, transfusion should be started with plasma (as restoration of blood volume is the prime necessity), following with cross-matched blood. In rare cases, group O blood may be given without the safeguard of cross-matching, but in women below or in the child-bearing age whose Rhesus group is unknown or negative and in all recipients of previous transfusions whose Rhesus group is unknown or negative only Rhesus negative blood may be used.

(2) **Plasma.** When there has been no blood loss, or if blood is not immediately available, restore blood volume by plasma. It is a good rule to give one pint of blood to every two pints of plasma whether there has been blood loss or not.

(3) **Routes.** In dangerous states of shock, especially with continued blood loss, more than one vein and giving set should be used. Besides the usual veins, the femoral and jugular may be used and the sternal marrow is available if veins cannot be found even on cutting down.

(4) **Rate.** This must be rapid—blood or plasma being forced in (under air pressure, obtained by attaching a Higginson syringe to the air inlet of the blood or plasma bottle) at up to 100 cc per minute, or at least a pint every 15 minutes, until the B.P. reaches 100 systolic. Then continue at 40-60 drops per minute until normal B.P. is reached and the general condition is satisfactory and stable.

(5) **General Measures.** Do not omit:— arrest of haemorrhage: "head low" position: bandaging of limbs: relief of pain: warmth (avoid vaso-dilatation by overheating): warm drinks.

II.—IN ANAEMIA

Blood, not plasma, is indicated. Transfusion should be withheld until the cause of the anaemia is definitely established.

The blood used for cases of anaemia should be as fresh as possible as the continued survival of the transfused R.B.C. is important to the patient.

RATE: This must be slow—about 1 cc per pound body weight per hour—and in severe anaemias (Hb. less than 5 grams per 100 cc) still slower.

A rate of 25 drops per minute gives approx. 100 cc per hour.

A rate of 50 drops per minute gives approx. 200 cc per hour.

A rate of 100 drops per minute gives approx. 400 cc per hour.
In infants a very slow rate should be used (see below).

DOSE: In adults 500 cc of blood will increase the Haemoglobin level by some 7 to 10 per cent. A rise of more than 30 per cent should not be attempted at one transfusion, and two days should elapse before a further transfusion is given. Generally the DOSE in cc equals TWO-FIFTHS BODY WEIGHT in POUNDS multiplied by Hb. per cent RISE REQUIRED.

Note: The use of CONCENTRATED RED CELLS (i.e. whole blood minus plasma) is indicated in severe anaemia, especially when there is cardiac failure.

CHILDREN AND INFANTS: The above formula (dose in cc = two-fifths body weight in lbs × Hb. per cent rise required) holds in general. While in infants showing anaemia (e.g. Rh incompatibility) volumes of 150-200 cc may be given at one transfusion, a VERY SLOW RATE of FLOW must be maintained—e.g. 8-12 drops per minute. The use of concentrated R.B.C. should be considered.

III.—IN BURNS

The Secondary Shock following burns of more than 15 per cent of the body surface is liable to be severe owing to excessive loss of plasma protein in exudate from the burnt surface and into the damaged tissues beneath. PLASMA is the fluid of choice for replacement and may be given in normal or increased protein concentration.

If plasma is not available BLOOD should be used.

Crystalloid solutions should not be given I.V. for the first 24 hours, but may then follow plasma if there is dehydration (with probable electrolyte deficiency) and the patient is not drinking.

The INITIAL DOSE OF PLASMA may be approximately calculated in one of two ways—

(1) From the Area of the Surface Burnt.

The AREA is calculated according to BERKOW'S FORMULA (modified):

SURFACE AREA OF	% OF TOTAL BODY SURFACE	
	Over 5 years and Adults	Under 5 years
Head	9%	17%
Neck	2%	2%
Upper Arms	8%	8%
Forearms	6%	6%
Both Hands	5%	5%
Front of Trunk	13%	13%
Back of Trunk	13%	13%
Genitalia	1%	1%
Both Buttocks	5%	5%
Both Thighs	18%	13%
Both Legs	13%	10%
Both Feet	7%	7%

Plasma should be given immediately if the area burnt exceeds 10 per cent of the body surface, and in the amount of 100 cc for each one per cent of skin surface burnt.

(2) From LABORATORY TESTS: Give 100 cc fluid for each unit the P.C.V. is above 45; *or* give 50 cc fluid for each unit the Hb. per cent is above 100. **Note:** If the PLASMA PROTEIN is low, increase the calculated amount by 25 per cent for every gram the total protein is below 6 grams per 100 cc.

RATE: Of the volume calculated to be initially required, give about—

one-half in first 4-6 hours,
one-quarter in next 6 hours,
one-quarter in next 12 hours,

and continue, depending on condition of patient as shown by B.P., Pulse, Hb., or P.C.V. readings, and the urinary output.

IV.—MISCELLANEOUS USES:

(a) For leucocytes and platelets, it is essential to use FRESH blood—not older than 12 hours. As leucocytes survive in the body for only very short periods, transfusions given to increase their number are of questionable value.

(b) For protein deficiency, every gram per 100 cc. the plasma protein is down represents a deficiency of some 40 grams of protein in the total plasma volume. Large amounts of plasma, even when given concentrated, are required to restore a deficiency.

UROLOGY

(*Urologist:* MR. EDGAR R. REAY)

WATER AND ELECTROLYTE BALANCE

WATER

Water is essential for life and well being because:—

(1) A large part (75 per cent) of the body is water, of which 50 per cent is intracellular and 25 per cent is extracellular.
(2) The volume and state of the blood depends on the amount of water in the body. Blood is 9 per cent of body weight and plasma 5 per cent.
(3) Water is necessary for excretion of urine and faeces, and for maintenance of normal temperature by sweating.
(4) There is an internal water exchange in the alimentary tract, digestive juices being secreted in large quantities and absorbed lower down the bowel.

Intake: In addition to fluids taken by mouth the food of ordinary diet gives about 14 cc water per 100 calories—i.e. some 300-400 cc in the case of Full Diet, and therefore often negligible in the sick patient.

Output: Losses occur by:—

(1) **Lungs and Skin:** Normally about 850 cc per day; in sick persons about 2000 cc. In fever and hyperthyroidism may be much greater. Visible sweating indicates a loss of at least 2000 cc.

(2) **Gastro-intestinal Secretion:** This amounts to about 8 litres per day, but is normally almost entirely re-absorbed, only 150 cc being lost in faeces. There may however be considerable loss in vomiting: fistulae: diarrhoea: gastric suction drainage: and in low intestinal obstruction and paralytic ileus there may be a "masked internal loss" of some 8 to 10 pints. This "internal loss" may be subsequently removed by aspiration: or the condition may spontaneously rectify itself when a sudden diuresis may appear.

(3) **Urinary Secretion:** Normal kidneys concentrating to a maximum S.G. of 1028-1032 can eliminate all waste products of 24 hours metabolism in 500 cc Urine. Kidneys of poor function concentrating to a S.G. of about 1010 may require 1500 cc of water to eliminate 24 hours waste products, i.e. an allowance of 1500 cc water for urinary secretion permits the complete elimination of waste products by kidneys of all grades of function. Failure of excretion results in acidosis and a rising T.N.P.N.

BASIC DAILY REQUIREMENT of Water in the Average Sick Person

For loss by lungs and skin say . . . . . 2000 cc
For loss by urinary secretion . . . . . 1500 cc

Total . . . . . 3500 cc

Treatment: If the above 3500 cc (the Basic Daily Requirement of water) cannot be taken by mouth, it can be given rectally or intravenously as distilled water made isotonic with 5 per cent of glucose. The glucose protects the liver and is metabolised producing energy and becoming available as water.

ELECTROLYTES

Electrolytes are essential in the maintenance of the acid base ratio of the blood and in the movement of fluid between the vascular and interstitial compartments.

The important electrolyte is SODIUM CHLORIDE.

SALT Intake: This may vary from 5 to 12 grams — 5 grams being the minimal daily intake, though for a few days an intake of even 1-2 grams can be tolerated.

Output: (1) Sweat. Loss is negligible unless sweating is excessive.

(2) In Gastro-intestinal Secretions. Normally salt is not lost because of reabsorption, but may be in vomiting, fistulae, diarrhoea or gastric drainage or temporarily by "masked internal loss". From the stomach the loss is mainly the chloride ion leaving an alkalosis, and from the intestine the sodium ion leaving an acidosis.

(3) Urinary Secretion. The kidney can excrete an excess of chloride, or retain chloride when there is a deficiency within the organism. When plasma chloride values fall the loss of chloride in the urine is curtailed — chloride may disappear from the urine. To maintain the proper acid base ratio of the blood the kidney can select and excrete the unwanted ion (Cl in acidosis, Na in alkalosis) from the saline solution of the plasma.

To detect DEFICIENCY OF SODIUM CHLORIDE two tests may be used:—

(1) Estimation of PLASMA CHLORIDE (a Lab. test).

(2) Estimation of URINARY CHLORIDE (FANTUS' ward test).

FANTUS' TEST: To 10 drops of urine in a test tube add one drop of 20 per cent potassium chromate. To the yellow solution add drop by drop 2.9 per cent silver nitrate until a distinct colour change to red brown occurs. The number of drops added represents in grams the chloride content of a litre of urine. The normal is 5 grams.

Treatment. If the clinical findings, confirmed by one of the above tests, indicate electrolyte deficiency then NaCl must be replaced. As in these cases it is not usually possible to do so by mouth, NORMAL SALINE (8.5 grams NaCl/1000 cc) must be given rectally or intravenously until the clinical state or tests indicate restoration of electrolytes.

DANGERS. There are dangers in the giving of large amounts of fluid especially by the intravenous route. The principal risk is the uncontrolled use of saline solution and the deposit in the body of excessive salt. The body normally requires about 5 grams of salt daily—there are 8.5 grams of salt in one litre of Physiological salt solution. The more sick the patient is, the greater the tendency to give large amounts of fluid. In ill and under-nourished persons blood protein values are usually low. The lower the serum proteins the less salt it requires to produce oedema. The salt tends to pass to the tissues drawing fluid with it and may even wash serum proteins from the blood stream into the tissue fluids. Blood chloride values may be normal or even low and give no indication of this salt retention. When oedema appears in a surgical patient there

are two predominant questions:— 1. What is the value of plasma protein?
2. How much saline has been given?

Saline solutions should not be given except to replace specific abnormal body losses.

A warning should be given about fluid intake in the patient with deficient renal function and a low output of urine. This applies particularly to cases of anuria. In these cases a powerful diuretic in the form of urea is circulating in the blood in increased amounts. If the kidney cannot use the fluid presented to it with this stimulus then the fluid must pass to the tissues with the onset of oedema. In cases of anuria, fluid intake must be limited to match body losses. In those with no excessive skin loss and no abnormal losses, intake may be restricted to as low as 1000 cc per day.

DEHYDRATION. This condition usually involves both water and electrolyte deficiency, as clinically it commonly follows abnormal losses of fluid and salt in vomiting, gastric drainage, fistulae, diarrhoea, excessive sweating, severe and prolonged diuresis (as in diabetes), in hyperthyroidism and in the masked internal loss of intestinal obstruction.

WATER DEFICIENCY SYMPTOMS are a hot dry skin, parched tongue, sunken eyes, slight fever, scanty concentrated urine, and a rising T.N.P.N. The water deficiency may be up to 6 per cent of body weight, (i.e. 4000 cc in an 80 kilo. patient). This deficiency if present alone can be treated by 5 per cent glucose in water.

ELECTROLYTE (SALT) DEFICIENCY is however frequently present as well and if severe may cause SYMPTOMS of marked lethargy, nausea, vomiting, dulness and muscular twitching—symptoms often confused with those of the associated disease. The diagnosis is confirmed by estimation of BLOOD or URINARY CHLORIDE, and treatment is by NORMAL SALINE until the values are restored.

Note. Electrolyte deficiency due only to excessive sweating can be adequately treated by saline drinks—or by I.V. saline of low concentration (e.g. BART'S SOLUTION).

SUMMARY OF WATER-ELECTROLYTE THERAPY

(1) If the Basic Daily Requirement of WATER (3500 cc) cannot be taken by mouth give 5 per cent GLUCOSE rectally or intravenously.

(2) If there is loss of water and electrolytes by abnormal channels and blood or urinary chlorides are low replace water and electrolytes by NORMAL SALINE.

(3) If there is a further loss of plasma protein by haemorrhage or secondary shock then these losses must be restored by the only solutions capable of so doing—blood or plasma.

(4) If a patient is passing daily 1000 cc urine of fair S.G. or 1500 cc urine of low S.G. and the urine contains chloride, the water and salt requirements of the patient are satisfied.

DIRECTIONS FOR USE OF BLOOD-PLASMA-CRYSTALLOID INFUSION and FLUID BALANCE RECORD

1. The Form is intended for use whenever intravenous fluid (Blood, Plasma or Crystalloid Solutions) is given and the essential fluid balance is being kept. It should be hung in holder on the transfusion stand.

2. The Medical Officer should complete the upper part of the Form, especially as regards "conditions requiring Intravenous Infusion", so as to gain a clear idea of requirements.

3. The Medical Officer should then indicate in the appropriate columns the **Type of Fluid,** the **volume to be given,** and **rate** at which it is to flow. As far as possible this should be done for several bottles ahead for the information of the nursing staff.

4. The **Date** and **Time** each bottle is put on is entered by the person doing this. The rate of flow is checked and the **number** of the bottle of **blood or plasma** is inserted in the "Type of Fluid" column.

5. The occurrence of REACTIONS (Rigors, etc.) is recorded in the column so headed as +, + +, + + +. A note of reactions should be made on the label on the blood or plasma bottle.

6. An EIGHT HOURLY FLUID BALANCE is kept (Periods 6 a.m.—2 p.m.; 2 p.m.—10 p.m.; 10 p.m.—6 a.m.)

Intake. Drinks by mouth are noted on a separate sheet, and the 8 hours' total entered on the Form. This plus the total of I.V. fluid given during the period (allow for amount still in bottle) makes TOTAL INTAKE. (Rectal and subcutaneous fluid, if given, should also be added.)

Output. The volume of urine, vomit, diarrhoea and drainage fluid are recorded on a separate sheet and the 8 hours' total entered on the Form. These are added together to make the TOTAL OUTPUT. The S.G. is taken on the pooled 8 hour urine and noted. Sweating is recorded as N. for Nil and as +, + +, + + +, etc.

Note: (a) All entries to be made in cubic centimetres (cc).
1 fluid oz = 30 cc approximately.

(b) The 8 hourly totals should be entered opposite the bottle of fluid running in at the time. The time given in the second column will indicate the 8 hourly period being entered.

7. CONTROL OBSERVATIONS. Such clinical and laboratory observations as are indicated by the condition of the patient and the enthusiasm of the Visiting and Resident Physicians or Surgeons should be made and recorded in the appropriate column.

8. The person discontinuing the infusion should note the time of so doing on the next line below.

BLOOD — PLASMA — CRYSTALLOID INFUSION and FLUID BALANCE RECORD

PATIENT'S NAME..... SEX..... AGE..... WARD ..... DOCTOR .....

CLINICAL DIAGNOSIS .....

CONDITIONS REQUIRING INFUSION AND AFFECTING FLUID BALANCE (delete those not present):— HAEMORRHAGE: ANAEMIA: SECONDARY SHOCK: BURNS: DEHYDRATION: VOMITING: GASTRIC DRAINAGE: INTESTINAL STASIS: DIARRHOEA: EXCESS SWEATING: OLIGURIA: ANURIA: OTHER:.....

PRE-INFUSION: TEMP.....°F. PULSE..... RESP..... B.P.....R.B.C..... Hb..... P.C.V.....

URINARY OUTPUT.....C.C. IN.....HOURS. URINE or PLASMA CHLORIDE.....

Date and No. of Bottle	Time Each Bottle Put On	Rate to Flow in Drops per Min.	Fluid (Include No. of Blood or Plasma Bottle)	Vol. of Fluid in C.C.	EIGHT HOURLY FLUID BALANCE							Pulse	B.P.	Tongue	R.B.C. Hb. or P.C.V.	Plasma Protein	Plasma or Urine Chloride	Basal Creps or Oedema	Reactions
					Fluid by Mouth	Subcut and Rectal	Total Intake	Vol. and S.G. of Urine	Vomit and Other Losses	Sweating	Total Output								

X-RAY DEPARTMENT

(*Director of Radiology*: DR. G. L. ROLLESTON)

GENERAL:

1. THE DEPARTMENT IS OPEN from 8 a.m. to 4 p.m. daily, Monday to Friday inclusive, and from 8 a.m. to 12 noon on Saturday.

2. HOSPITAL OUTPATIENT AND PRIVATE PATIENT examinations are conducted from 8 a.m. till 2.30 p.m. daily, Monday to Friday inclusive, and from 8 a.m. till 11 a.m. on Saturday.

3. HOSPITAL INPATIENT AND OUTPATIENT examinations must be requisitioned on Form H. It is of the greatest importance to quote the serial number or date of the previous examination. The original form should be used for subsequent examinations, continuing on the back of the form when necessary.

   The Department will make an effort to issue a report by 4.30 p.m. on all examinations conducted before 12 noon. Examinations which are conducted after 12 noon will not be reported until the following day, except in cases of urgency.

4. PRIVATE PATIENTS REFERRED FOR EXAMINATION must present a letter furnished by a Medical Practitioner. In addition to giving relevant clinical details it is of great help to the Department to quote the previous serial number or date of a previous examination. If this information is available, there should be no delay in the issuing of reports.

5. PROCEDURE TO BE ADOPTED BY MEDICAL PRACTITIONERS referring cases of suspected fracture to Christchurch Hospital:

   (a) If a Medical Practitioner wishes his patient to be X-rayed and treated at the hospital, he should refer the patient with a note to that effect to the Casualty Officer.

   (b) If the Medical Practitioner wishes to treat his patient privately, he should refer the patient with a note to the X-ray Department. If a fracture is present, the Department will endeavour to notify the practitioner as soon as possible. Patients should not be sent to the X-ray Department with a note requesting X-ray examination and, if positive, treatment at the Orthopaedic Department. Such patients should be referred direct to the Casualty Officer.

   It must be clearly understood that all private patients referred to the X-ray Department will be instructed to report back to their own Doctor.

6. FILMS MUST NOT BE TAKEN from the Department in their original envelopes. Before taking films, the office must be notified so that a new envelope may be issued. If films are to be taken from the Department when the office is closed, a note must be left giving the name of the patient, serial number, and the name of the Medical Officer taking the films.

7. WHEN the DEPARTMENT IS CLOSED only urgent Hospital work is accepted. These examinations must be approved either by a Member of the visiting Staff or a senior member of the House Staff. Enquiries should be made at the Telephone Exchange to find out which member of the X-ray Department is on call.

EXAMINATION OF SKULL, SPINE, URINARY SYSTEM, PELVIS, HIPS, ETC.

In all instances a more satisfactory examination can be carried out by transferring the patient in the Department to a special table. When the patient is not able to get out of bed, he should be placed on a canvas stretcher in the ward.

CHEST EXAMINATIONS

Whenever possible these cases should be examined in a standing position. When the patient is too ill to stand films can be taken in bed without disturbing the patient to any extent. The House Surgeon should state clearly on the requisition form whether the patient is fit enough to stand.

Films taken in bed are of little value in assessing cardiac enlargement and heart examinations should, where possible, be deferred until the patient is well enough to stand.

GASTRO-INTESTINAL EXAMINATIONS

A. **Barium Swallow, Barium Meal:**

1. Appointments are given for all Hospital Outpatient and Private patient examinations.
2. Requisitions for Inpatient examinations should reach the Department the afternoon before the morning of the examination.
3. Barium Meal examinations are not conducted on Fridays or Saturdays.

Preparation of the Patient:

The only preparation required is that the patient should come to the Department in the morning with an empty stomach, having had nothing to eat or drink after midnight.

Notes: 1. It may be necessary for further examinations to be conducted over the subsequent 24 hours. The necessary instructions for these examinations will be given by the Department.

2. The Barium Meal examination is conducted in a standing position. If a patient has been confined to bed for two or three weeks, he should be allowed to get up on several occasions before a Barium Meal is arranged. If the investigation is required on a completely bedridden patient, the Medical Officer should consult with the Radiologist.

3. The procedure to be adopted with infants examined for suspected pyloric stenosis is as follows. Barium supplied by the Department is given from a bottle at 3 a.m. Fluoroscoptic examination is carried out at 9 a.m.

4. The Barium Meal and follow through examination are of little value in the diagnosis of organic lesions of the colon.

B. **Barium Enema:**

1. Appointments are given for all Hospital Outpatient and private patient examinations.
2. Requisitions for Inpatient examinations should be in the Department the afternoon prior to the morning of the examination.

Preparation of the Patient:

1. HOSPITAL INPATIENTS. The patient should be given an aperient before breakfast on the day prior to the examination. Liquorice powder in a dose of four teaspoonsful for an adult is the most satisfactory agent. An evacuant enema should also be given in the early morning of the day of the examination.
2. HOSPITAL OUTPATIENTS AND PRIVATE PATIENTS. Four teaspoonsful of liquorice powder supplied by the Department when the appointment is made is to be taken before breakfast on the day prior to the examination.

Note:

The barium enema is of no value in the diagnosis of organic lesions of the rectum. A rectal examination should always be done prior to sending the patient for a barium enema.

C. CHOLECYSTOGRAM (Graham's Test)

1. Appointments are given for all Hospital Outpatient and private patient examinations.
2. Requisitions for Inpatient examinations should reach the Department the morning before the day of the examination.
3. The test will not be commenced later in the week than Thursday.

Method of Examination:

1. Prior to giving the opaque medium (Pheniodol), a preliminary film of the gallbladder region is taken.
2. In the case of Hospital Inpatients the Pheniodol is ordered by the X-ray Department and is supplied to the Ward through the Dispensary. It is administered in the evening according to instructions which are attached to the treatment sheet (Form L).
3. In the case of Hospital Outpatients and private patients, the Pheniodol is supplied to the patient by the Department together with instructions.
4. Films are taken of the gallbladder region the following day, fifteen hours after ingestion of the dye. Another examination is carried out after a fatty meal.

Note:

1. The reliability of the test depends on the absorption of an adequate quantity of the opaque medium from the gastro-intestinal tract into the blood stream. It is important, therefore, that the Ward should notify the Department if the patient vomits after taking the Pheniodol.
2. The results of the test are often unreliable in the presence of organic lesions of the upper gastro-intestinal tract.

EXAMINATION OF THE URINARY SYSTEM

INTRAVENOUS PYELOGRAPHY

Appointments for Intravenous Pyelograms are made through the Hospital Urological Department.

The Urological House Surgeon should advise the X-ray Department at least a day before the examination is to take place.

One Intravenous Pyelogram examination is conducted daily, Monday to Friday inclusive, commencing at 8.15 a.m.

Preparation of the Patient:

Avoid obscuring the renal tracts by intestinal contents and gas.

1. An aperient, preferably liquorice powder (four teaspoonsful for an adult), should be given before breakfast on the morning prior to the day of the examination.
2. The patient should not, if possible, be confined to bed during the 24 hours preceding the examination.
3. The patient must have nothing to eat or drink after midnight.
4. Immediately before coming to the Department the patient is instructed to pass urine.

The Ward should provide: a tray arranged for intravenous injection.

Dosage and Administration of the Opaque Medium:

The opaque medium (Uropac) is an organic iodine preparation, and is supplied in Ampoules for Intravenous injection.

Before giving the injection, the Urological House Surgeon should always question the patient concerning Iodine sensitivity or any other allergic manifestations. If a history of such sensitivity is given the examination should be deferred until sensitivity tests have been conducted. The average dose for patients over the age of fifteen years consists of the contents of an Ampoule of 20 cc.

For patients under fifteen years, 1cc. may be employed for each year with a minimum of 4 cc.

After warming the solution to body temperature by standing the ampoule in warm water, the injection is made slowly into a superficial vein. To deal with a severe allergic reaction an emergency tray containing adrenalin, cardiac stimulants, etc. is immediately available in the Department.

In the case of infants on whom intravenous pyelography is not possible, an intramuscular injection using Diodone may be used. The Urological House Surgeon should consult with the Radiologist before carrying out an intramuscular pyelogram.

Contra-Indications:

The examination is contra-indicated in patients showing evidence of marked renal or hepatic insufficiency or advanced cardiac disease.

Retrograde Pyelography:

Cystoscopic examination and the insertion of ureteric catheters is carried out in the operating theatre. The patient is then transferred to the X-ray Department for pyelography. Uropac solution is used as the opaque medium. These

examinations are normally carried out on Monday and Friday mornings. If a retrograde examination is to be carried out on other days of the week, the Urological House Surgeon must notify the Department as soon as possible.

Cystography and Urethrography:

It is necessary for the Urological House Surgeon to make an appointment for these examinations. It is also his responsibility to order one pint of 10 per cent Sodium Iodide from the Dispensary for cystography.
Uropac is usually used for Urethrography.

SPECIAL EXAMINATIONS

SINOGRAPHY. LIPIODOL WITH T TUBE. PLEUROGRAPHY.

These examinations are conducted by the X-ray Department on Hospital Inpatients, Outpatients, and Private Patients. An appointment will be made after consultation with the Radiologist.

BRONCHOGRAPHY. LUMBAR ENCEPHALOGRAPHY. MYELOGRAPHY.

These examinations are conducted on Hospital Inpatients only. In each instance an appointment will be made after consultation with the Radiologist.

BRONCHOGRAPHY

Preparation of the Patient:

Preliminary tests for iodine and cocaine sensitivity should be carried out. Potassium iodide gr.10 is given by mouth thrice daily for three days, and the patient watched for nasal catarrh, lachrymation or rash. Cocain hyd. gr.1/6th is injected subcutaneously and the patient watched for faintness, dyspnoea, palpitations.

Prior to bronchography the patient should be fasting. Preliminary sedation is left to the discretion of the Medical Officer in charge.

Postural drainage, if indicated, should be carried out for several days prior to the examination.

Method:

Several methods are available for the introduction of Lipiodol (an opaque oil) into the bronchial tree. The procedure used depends largely on the age and condition of the patient.

The examination is carried out in the X-ray Department by the Senior Residential Medical Officer and the Radiologist.

After Treatment:

1. The patient should be encouraged to cough in order to expel the Lipiodol from the bronchial tree. For this purpose, the foot of the bed should be raised on blocks.

2. The patient should have nothing to eat or drink for at least two hours following the examination. This allows time for the anaesthetised pharynx and larynx to return to normal.

LUMBAR ENCEPHALOGRAPHY

Preparation of the Patient:

Prior to encephalography the patient should be fasting. Preliminary sedation is left to the discretion of the Medical Officer in charge.

Method:

The examination is carried out in the X-ray Department by the Senior Resident Medical Officer and the Radiologist.

The tray containing the necessary instruments is ordered by the R.M.O. from the Theatre.

Lumbar puncture is performed in the sitting position. Cerebro-spinal fluid is withdrawn and replaced by air. A total of 40-60 ccs of air replacement is usually necessary.

Note:

Reactions after encephalography are often severe. Vomiting, collapse, and severe headache are not uncommon.

In the presence of a raised intracranial pressure, Lumbar encephalography is contra-indicated.

MYELOGRAPHY

Method of Examination:

A Lumbar puncture is performed in the ward and 3 ccs of an opaque oil called Pantopaque is injected into the sub-arachnoid space.

The patient is immediately placed in the prone position and remains in this posture until the conclusion of the examination.

Fluoroscopic examination on the tilting table is carried out in the X-ray Department.

RADIOTHERAPY DEPARTMENT

(*Radiotherapist*: DR. A. J. CAMPBELL)

Requests for Radiotherapy should be made to the Department in writing with a short account of the clinical history, examination, and investigations previously carried out. An appointment will be given for the patient to attend the Department for examination and subsequently for treatment if, on consultation, this seems desirable.

All cases will be treated on their merits, but treatment for treatment's sake with no particular aim or hope of result is to be deprecated.

Localisation of a tumour and some idea of its size, distribution and nature, are important points that require close consultation between the referring authority, the Radiotherapist and such other consultants as may seem necessary, e.g. Aurist, Radiologist, Pathologist, etc.

The majority of cases treated by Radiotherapy will show evidence of this treatment by a "reaction" of the area treated. This varies from a faint erythema or bronzing to definite blistering and loss of skin or mucous membrane and the area may become covered by a yellow slough. This is to be expected in any radical course of Radiotherapy and must not be regarded as a so-called "radium burn". Treatment of the area with mild antiseptic washes and a bland ointment, together with reassurance to the patient should suffice. The reaction is usually at its peak in about three weeks and in the subsequent three weeks should gradually subside. In large areas epithelialisation may be slow and skin grafting may be necessary. Scarring is considerable after radical doses of therapy with subsequent atrophy of the overlying skin. Patients should be warned to avoid injury to the treated area, especially from sunburn and the use of strong medicaments.

Radium Needles and Tubes. A red card is issued with all radium applicators leaving the Department, stating the amount of radium and the type of applicator (e.g. needles, tubes, plaques).

The amount of radium returned should be checked by a member of the staff of the Department and recorded on the red card.

If the Department is closed when radium is to be returned the key to the emergency safe may be obtained from the Medical Superintendent.

DIETARY DEPARTMENT

GENERAL INFORMATION

DIET REQUISITIONS

Ward Diets. Orders for general Ward Diets—Light and Full—are to be written on the Daily Supplies Requisition **daily** by the Ward Sister, and must be delivered to the Diet Letter-box by 7 a.m. Soft Diets and Liquid Diets can be compiled in the Ward.

SPECIAL DIETS

Orders for all diets—except Liquid, Soft, Light and Full—are to be written on special Diet Requisition form. **All requisitions for Special Diets must be signed by a Medical Officer.**

Telephone orders are accepted in emergencies and should be followed as soon as possible by a special **Diet Requisition.**

New Diets and Diet Changes will be started immediately, if possible, and not later than the morning of the following day.

All new Diabetic Diets will be started the following meal. Diabetic diet changes will be started the following morning.

To **discontinue a Special Diet** a telephone or verbal message may be given to a Dietitian.

DIET INSTRUCTION

The Diet Department should be notified immediately it is known that a **Special Diet Patient** is for **discharge**—diet instruction can then be given. Since all diet instruction is individual, and consequently time consuming, it is requested that the Dietitian be notified as early as possible. Details of the diet to be followed on leaving hospital are furnished to the patient.

EXTRAS—such as Cream, Eggs, Oranges, Lemons, etc.

If extras are required for patients on general diets, these may be ordered by a Medical Officer on Form D.P.ii.

Ice Cream, required after tonsillectomy is ordered on Form D.P.ii. It must be signed by a Medical Officer.

Vitamin Concentrates are ordered as drugs from the Dispensary.

DAILY REQUISITIONS FROM WARDS

The sheet from Book 6 is completely filled in by the Ward Sister or her deputy, and left in the Diet Kitchen letter-box, every evening except Friday and Saturday, and days preceding public holidays. All details must be entered, e.g.

1. Patients not requiring diet.
2. Nurses on duty.

The following maximum servings are allowed:

Chicken—1.

Total Sweets—2 times the number of patients requiring general diet.

Meats—Equal to the number of patients requiring general diets.

Stores are ordered as required, excepting tea, sugar, butter, eggs, lemons and oranges. These amounts are stated in the Christchurch Hospital Basis for Ordering Ward Supplies.

BASIS FOR ORDERING WARD SUPPLIES

No. of Patients	Cream ozs.	Butter ozs.	Eggs No.	Oranges	Lemons	Servings of Custard
10-20	2	2	6	3	3	6
21-30	4	4	8	4	4	12
31-40	6	6	10	5	5	12
41-50	8	6	12	6	6	16
Ward 9	½ oz. per child	8 ozs.	24	½ each child		16

EXTRAS:

Cream: Peptic Ulcer .. .. 1½ ozs.
Tuberculosis .. .. 1 oz.
Typhoid .. .. 12 ozs.
High Vitamin .. .. 1 oz.
Sick Nurses .. .. 1 oz.
Orthopaedic .. .. 1 oz.
Acute Nephritis .. .. 1 oz.

Milk: 1¼ pints for each patient. 1 pint extra for each peptic ulcer case.

Tuberculosis and other chest conditions:
Children 1¾ pints each.
Typhoid fever 1½ pints each.
½ pint for each nurse on duty.

STANDARD HOSPITAL DIETS

No. 1 LIQUID DIET

Composed of foods liquid at body temperature. Usually given during first stages of acute illness or when it is necessary to rest the organs of digestion. Foods included are : milk, strained broths, strained gruels, egg nogs, cream soups, fruit juices, etc. Calorie value may vary 1000-2000 calories.

Sample Diet

Approximate Analysis:

Protein: 60-70 gms.
Carbohydrate: 200-250 gms.
Fat: 70-80 gms.
Calories: 1500-1800

Calcium: 1.2-1.8 gms.
Phosphorus: 1.08-1.5 gms.
Iron: 6 mgs.
Vitamin A: 3000-5000 I.U.
Thiamin (B1): .7 mgs.
Riboflavin: 3.2 mgs.
Nicotinic Acid: 5.6 mgs.
Vitamin C: 70-100 mgs.
Concentrated Vitamin C should be added to fruit drinks to increase Vitamin C intake.

Early a.m. Milk.

Breakfast. Cereal gruel with sugar and cream.

10 a.m. Egg flip. Fruit juice.

Noon. Cream soup. Soft custard with cream and sugar. Milk.

3 p.m. Milk. Fruit juice.

4.30 p.m. Beef tea or strained meat soup plus 1 teaspoon yeast extract. Fruit or tomato juice. Arrowroot with milk.

8 p.m. Milk beverage or egg flip.

No. 2 SOFT DIET

Includes foods listed in liquid diet with the addition of custards, junkets, jellies, ice cream, pureed or soft vegetables and fruits, cereals, milk toast, bread (crustless) and butter. Calorie value 1500-2500 calories.

Sample Diet

Approximate Analysis:

Protein: 70 gms.
Carbohydrate: 190-250 gms.
Fat: 80 gms.
Calories: 1750-2000

Calcium: 1.6 gms.
Phosphorus: 1.6 gms.
Iron: 7 mgs.
Vitamin A: 4500 I.U.
Thiamin (B1): 1 mg.
Riboflavin: 3.6 mgs.
Nicotinic Acid: 13 mgs.
Vitamin C: 85 mgs.

Breakfast. Stewed fruit or cereal with milk and sugar. Soft cooked egg. Bread and butter. Milk.

10 a.m. Milk beverage or egg flip.

Noon. Beef tea or strained meat soup. Pureed vegetables and sauce. Custard and pureed fruit or jelly and cream. Milk.

3 p.m. Fruit juice. Milk beverage.

Tea. Cream soup or lightly cooked egg, custard, etc. Milk. Bread and butter plus yeast extract, 1 teaspoon. Milk beverage.

8 p.m. Milk beverage.

No. 3 LIGHT DIET

Is a preliminary to a regular normal diet. Foods included are those in No. 2 Diet, plus fish (not fried), chicken, rabbit, boiled lamb or mutton, brains, sweetbreads, tripe, certain soft vegetables, fruit etc. Calorie value 2000-2600.

Sample Diet

Approximate Analysis:

Protein: 70-90 gms.
Carbohydrate: 280-320 gms.
Fat: 80-110 gms.
Calories: 2000-2600

Calcium: 1.3-1.5 gms.
Phosphorus: 1.4-1.7 gms.
Iron: 12-15 mgs.
Vitamin A: 4600-6700 I.U.
Thiamin (B1): .8-1.3 mgs.
Riboflavin: 3 mgs.
Nicotinic Acid: 12.5 mgs.
Vitamin C: 70-100 mgs.

Breakfast. Porridge with milk and sugar. Eggs or light exchange. Bread and butter, two slices. Honey. Milk.

10 a.m. Milk beverage.

Noon. Soup. Fish or light meat. Potato. Vegetable. Custard or milk pudding. Stewed fruit. Cream.

3 p.m. Milk beverage.

Tea. Eggs or light exchange. Bread and butter, two slices. Milk. Raw fruit (supplied by patient).

Supper. Milk beverage.

No. 4 FULL DIET

Is used for patients whose digestion is normal, and includes all foods listed previously, plus red meats, cereals, vegetables and fruits etc. Calorie value 2000-3000 calories.

Sample Diet

Approximate Analysis:

Protein: 90-120 gms.
Carbohydrate: 150-350 gms.
Fat: 100-120 gms.
Calories: 2400-3000

Calcium: 1.5-1.8 gms.
Phosphorus: 2 gms.
Iron: 14-17 mgs.
Vitamin A: 4000-6000 I.U.
Thiamin (B1): 1.1-1.5 mgs.
Riboflavin: 3.5 mgs.
Nicotinic Acid: 20.0 mgs.
Vitamin C: 70-100 gms.

Breakfast. Porridge, sugar and milk. Eggs, 2 or meat, fish, etc. Bacon. Bread, two slices with butter and honey. Milk for tea.

10 a.m. Milk beverage.

Noon. Soup. Meat and gravy. Vegetables and potato. Apple pie or stewed fruit with milk pudding. Cream.

3 p.m. Milk beverage.

Tea. Meat or substitute. Potato or substitute. Bread, three slices, with butter and honey. Cup of tea. Raw fruit (supplied by patient).

Supper. Milk beverage.

HIGH CALORIE DIET

A normal Full Diet with the addition of high calorie foods such as: butter, cream, barley sugar, lactose, high protein milk beverages, etc.

SUGGESTIONS FOR FEEDING CHILDREN

Milk. $1\frac{3}{4}$ pints, pasteurised, daily allowance. This includes milk used in cooking. This allowance may be increased at the discretion of the Ward Sister.

Vegetables. Two vegetables daily, one being carrots and a green vegetable. Potatoes in addition to above vegetables.

Fruits. Two servings of fruit daily, one to be raw—an orange per day is daily allowance for children; if unprocurable rose hip syrup should be used (1-2 tablespoons per child daily). Black currants are also valuable.

Eggs. One daily—or substitute—prepared any way except fried.

Meats. One serving of meat, fish or liver, mince, brains, etc. daily. Liver or kidney once a week. Fish once a week at least. Bacon is a food of good nutritional value and is usually very much enjoyed by children.

Cereals. Any cooked or prepared cereal, e.g., oatmeal porridge, Creamoata and Weetbix or Kornies plus Wheatgerm, supplied daily.

Bread. Day old white, or wholemeal bread, toast or rusks.

Cheese. A mild cheese may be substituted for meat.

Desserts. Custards, junkets, jellies, stewed fruits, plain steamed puddings, plain cereal pudding.

Undesirable Foods. Tea, coffee, fried foods, fresh breadstuffs, twice-cooked meats, cakes, pastries, pickles, etc.

General Rules for Feeding.

1. Serve three regular meals per day. Intermediate nourishment consists of a milk beverage or fruit drink at 10 a.m. and raw fruit 3 p.m.
2. Encourage, but do not force children to eat.
3. Serve food according to child's individual needs.
4. Dessert should be given only after first course is finished.
5. Teach child to eat a well-balanced diet.
6. Use sugar sparingly and do not allow indiscriminate use of sweets brought in by parents. All foodstuffs brought in **must** be handed in to the Sister-in-Charge of the Ward and distributed at her discretion.

TYPICAL DAY'S MENU IN CHILDREN'S WARD

Breakfast. Porridge. Stewed fruit and Weetbix or Kornies with Wheatgerm. Egg or tomatoes, liver, etc. and bacon. Toast or bread and butter. Milk.

10 a.m. Milk beverage, flavoured or plain.

Dinner. Meat, fish or mince. Potato. Vegetables, carrots and a green vegetable. Stewed fruit, junket, custard, jelly or plain steamed pudding. Cream.

3 p.m. Orange or raw fruit.

Tea. Vegetable broth. Egg, meat, fish or cheese. Bread and butter. Honey and jam. Raw fruit (lettuce and tomato in season). Milk.

6 p.m. Soup or cocoa.

SUGGESTED MEALS FOR CHILD 9-12 MONTHS

Breakfast. Strained cereal with milk. Rusk or oven dried bread and butter. Milk beverage.

Dinner. Vegetable broth. Vegetable puree with egg yolk or liver juice or red meat juice. Milk beverage.

Tea. Rusks or oven dried bread and butter. Pulped apple, prunes, apricot, peach, or raw, well mashed, ripe banana, with simple milk pudding. Milk beverage.

Fruit Juice. 2-3 tablespoons orange juice or its equivalent daily.

SUGGESTED MEALS FOR CHILD 12-18 MONTHS

Breakfast. Twice baked bread and rusk. Cereal and milk. Milk to drink. Piece of apple.

Mid-morning. Milk beverage.

Dinner. Baked bread. Coddled egg, or fish or brains or minced meat with chopped root and green vegetable and potato. Apple, prune or peach mashed. Milk to drink. Piece of apple.

Mid-Afternoon. Orange juice or rose hip syrup.

Tea. 2-3 wholesome sandwiches with fillings of honey, raisins, dates, yeast extract, cheese—finely grated, tomato; tender lettuce leaves should be offered with sandwiches. Fruit pulp with simple milk pudding. Milk to drink. Piece of apple.

N.B. Fish for children should be boned.

FOODS FOR THE EXPECTANT MOTHER

(Latter-Half Pregnancy)

Calories: 2400	Vit. A: 6000 I.U.
Protein: 85 gms.	Vit. B1: 1.5 mgs.
Calcium: 1.5 gms.	Riboflavin: 2.5 mgs.
Iron: 15 mgs.	Nicotinic Acid: 15 mgs.
	Ascorbic Acid: 100 mgs.
	Vit. D: 400 I.U.

MILK: 1¾ pints.

EGGS: 1 per day when priority rations are available (or at least 3-5 per week).

CHEESE: 1 cube daily.

MEAT: 1 serving per day.

LIVER, FISH: these at least once a week, in addition to meat.

POTATOES: one liberal serving each day.

GREEN VEGETABLES, or cauliflower, or swede: one liberal serving per day.

OTHER VEGETABLES: a liberal serving per day.

FRUITS: two servings per day—one to be rich in Vitamin C, e.g. oranges, grapefruit, tomatoes, tree tomatoes, Sturmer apples, gooseberries, or black currants in season.

IODISED SALT for all cooking and table use; use seameal if salt restricted.

BUTTER: full ration—other fats for cooking.

BREAD AND CEREALS: at least half to be whole grain.

PEANUTS, PEAS, BEANS OR LENTILS: several times per week.

COD-LIVER OIL: 1-2 teaspoons per day or substitute.

YEAST EXTRACT: one teaspoonful daily.

Additional foods to supply requirements, depending on size and activity of the woman.

FOODS FOR THE NURSING MOTHER

Calories: 3000
Protein: 100 gms.
Calcium: 2.0 gms.
Iron: 15 gms.

Vit. A: 8000 I.U.
Thiamin: 1.5 mgs.
Riboflavin: 3.0 mgs.
Nicotinic Acid: 15 mgs.
Ascorbic Acid: 150 mgs.
Vit. D: 400 I.U.

MILK: 1¾ pints-2 pints (or even more if she is feeding twins).

EGGS: 1-2 per day where possible.

CHEESE: 1 cube daily.

MEAT: 1 large serving per day.

LIVER, FISH: at least once a week, in addition to meat.

POTATOES: one large serving per day.

GREEN VEGETABLES, or Cauliflower, or Swede: one large serving per day.

OTHER VEGETABLES: one large serving per day.

FRUITS: two servings (large) per day, one to be rich in Vitamin C, e.g. oranges, grapefruit, tomatoes, tree tomatoes, Sturmer apples, gooseberries, or black currants in season.

IODISED SALT for all cooking and table use.

BUTTER: full ration on table, other fats for cooking.

BREAD AND CEREALS: at least half to be whole grain.

PEANUTS, PEAS, or LENTILS to be taken often (several times per week).

COD-LIVER OIL: 1-2 teaspoons per day, or substitute.

YEAST EXTRACT: 1 teaspoonful daily.

Additional foods to supply requirements depending on size and activity of the woman.

VITAMINS

Vitamin	Available as	Strength	Normal Daily Requirement	Daily Therapeutic Dose
A	Liquor Vitamin A		5,000 I.U.	1 to 5 minims (2,500-12,500 I.U.)
	Concentrate B.P.	50,000 I.U. per gm.	Pregnancy 6,000 I.U.	
	Prepalin (liquid)	72,000 I.U. per gm.	Lactation 8,000 I.U.	1 cc
	Prepalin (capsules)	24,000 I.U. per gm.		3 capsules daily
	Prepalin (ampoules)	100,000 I.U. per gm.		1 cc weekly
D	Ostelin (liquid)	(5,000 I.U. per cc / 1 drop equals 150 I.U.)	400 I.U.	12-20 drops daily
	High Potency Ostelin	50,000 I.U. per tablet		1-6 tablets daily
	Ostelin (tablets)	500 I.U. per tablet		1-4 tablets t.d.s.
	Osto calcium (tablets)	(500 I.U. per tablet + / 100 mgs. calcium)		2-3 tablets t.d.s.
A & D	Adexolin (liquid)	(12,000 I.U.A. per gm. / +2,000 I.U.D. per gm.)		5 minims or 10 drops daily infants
	Adexolin (capsules)	(6,000 I.U.A. per capsule / +1,000 I.U.D. per capsule)		20-60 drops daily adults
	Adexolin (emulsion)	(18,000 I.U.A. per fluid oz. / +3,000 I.U.D. per fluid oz.)		1-3 capsules daily
	Dekadexolin (ampoules)	(60,000 I.U.A. per ampoule / +10,000 I.U.D. per ampoule)		1 tablespoon t.d.s.
	Oleum Vitaminatum B.P.	(1,000 I.U.A. per gm. / +100 I.U.D. per gm.)		45-90 minims t.d.s.
	Oleum Morrhuae B.P.	(600 I.U.A. per gm. / +85 I.U.D. per gm.)		45-90 minims t.d.s.
	Adeol	(25,000 I.U.A. per cc / 2,500 I.U.D. per cc)		2-10 minims daily
B1 (Thiamin) (Aneurin)	Berin (ampoules)	10-100 mgs. B1 per cc	1-1.8 mgs. (1 mg. B1 equals 333 I.U.)	10-50 mgs.
	Berin (tablets aneurine hydrochloride)	3-50 mgs. B1 per tablet		
Nicotinic Acid	Tab. Acid Nicotin. B.P.	50 mgs. per tablet	10-18 mgs.	1-2 tablets
	Pelonin (2 cc ampoules)	50 mgs. per 2 cc ampoule		50-100 mgs.
	Pelonin (tablets)	50 mgs. per tablet		1-2 tablets
	Nicotinamide (tablets)	50 mgs. per tablet		300 mgs.

VITAMINS—*Continued*

Vitamin	Available as	Strength	Normal Daily Requirement	Daily Therapeutic Dose
Riboflavin B2	Tab. Riboflavin Amp. Riboflavin	1–10 mgs. per tablet 1 mg. per ampoule	1.5-1.8 mgs. 2.5 pregnancy; 3.0 lactation	Up to 50 mgs.
Vitamin B6	B6 tablets B6 ampoules "Benadon"	20 mgs. per tablet 50 mgs. per ampoule		20-200 mgs. daily
Folic Acid	Folvite (tablets) Folvite (sol) Folvron (folic acid and iron)			5-20 mgs. daily, adult 5-10 mgs. daily, child 15 mgs. daily 3 capsules daily, one after each meal
Vitamin B12	Cytamen (Sol)	1 cc contains 20 mgs.		2 cc may be given in initial treatment
C (Ascorbic Acid)	Celin (1 cc ampoules) Celin Forte (5 cc ampoules) Celin (tablets) Rose hip syrup	10–100 mgs. per ampoule 500 mgs. per ampoule 50 mgs. per tablet 55 mgs. per fluid oz.		1-3 cc 1 ampoule 1-6 tablets } Up to 1,000 mgs. 2 tablespoons daily
K	Kapilon (1 cc ampoule)	5 mgs. per ampoule	?	**Obstructive Jaundice:** 1-2 cc daily pre-operative, 1 cc for 3-4 days post-operative **Neo-natal Haemorrhage** 1 cc repeat after 2 days if necessary
	Kapilon (liquid)	10 mgs. per cc	?	**Neo-natal Haemorrhage** 36 drops
	Kapilon (tablets)	10 mgs. per tablet	?	**Ante-partum Prophylaxis:** 5 tablets **Other conditions:** 1-5 tablets

VITAMINS—*Continued*

Vitamin	Available as	Strength	Normal Daily Requirement	Daily Therapeutic Dose
E (Tocopherol)	Viteolin (capsules)	10, 25, 50, 100 mgs. per capsule		Up to 300 mgs.
P (Citrin)	Permidin (tablets)	150 mgs. per tablet		50-150 mgs.
Polyvitamin Preparation	Penta-Kaps (capsules)	6,200 I.U. A. 9,000 I.U. D. 75 I.U. B.1 200 I.U. C. 20 Sherman units B2		
	Homicebrin (emulsion)	1 teaspoon contains: 3000 I.U. A. 266 I.U. B1 800 I.U. C plus D		
	Aktavite (granules)	2 teaspoons contain: 2000 I.U. A. 300 I.U. B1 300 I.U. C. 1000 I.U. D.		

APPROXIMATE VITAMIN CONTENT OF SOME COMMON SUBSTANCES

1 teaspoon Yeast Extract equals 250 micrograms Vitamin B1.
1 tablespoon Wheatgerm equals 120 micrograms Vitamin B1.
1 teaspoon Yeast, dried Brewers, equals 27 micrograms Vitamin B1.
1 teaspoon Cod Liver Oil equals { 3,000 I.U. Vitamin A. / 700 I.U. Vitamin D.
3 minim Capsule Halibut Oil (B.P.) equals { 4,000 I.U. Vitamin A. / 400 I.U. Vitamin D.

¼ cup Black Currants, fresh, equals 72 mgs. Vitamin C.
½ cup Brussels Sprouts equals 61 mgs. Vitamin C.
4 ozs. Orange Juice, equals 50 mgs. Vitamin C.
2 tablespoons Rose Hip Syrup equals 57 mgs. Vitamin C.
½ cup Tomatoes, outdoor, equals 25 mgs. Vitamin C.

DEPARTMENT OF MEDICINE

(*Director:* Dr. R. H. Quentin-Baxter)

HIGH VITAMIN DIET

In cases of avitaminosis, a normal well-balanced Full Diet is given, with additions from Diet Kitchen.

In conditions requiring a vitamin intake higher than normal, the **Physician should order vitamin concentrates** for the following reasons:

1. The vitamin concentrates insure a dose of known potency.
2. The vitamin content of the food varies with the soil, method of storage, preparation, cooking, etc., and therefore it is difficult to supply a specified amount of the vitamin.
3. Vitamin A concentrates are cheaper than their equivalent in foods.
4. The amount of food necessary to increase Vitamin B1 appreciably is too large to be practicable.
5. There is no potent food source of Vitamin D.
   Vitamin C can be supplied to the patient in form of orange juice or rose hip syrup, up to therapeutic dosage.

It must be remembered that foods contain more of the various types of vitamin factors than have yet been identified, much less synthesised. Therefore no vitamin therapy should be given without at the same time including foods, that are naturally rich in vitamin factors.

SAMPLE DIET

Composition:

Protein: 96 gms.	Vitamin A: 10,000 I.U.
Carbohydrate: 300 gms.	Thiamin: 2.7 mgs.
Fat: 140 gms.	Riboflavin: 3.6 mgs.
Calories: 2850	Nicotinic Acid: 19.6 mgs.
	Vitamin C: 100 mgs.

Daily allowance 1½ pints milk. 2 ozs. butter.

Sample Diet:

On Rising. 1 teaspoon dried brewer's yeast in glass of water.

Breakfast. 1 serving stewed fruit plus wheatgerm, 1 dessertspoon. 2 eggs **or** liver **or** fish plus 1 oz. bacon. 1 slice wholemeal toast and honey, jam, marmalade. Butter. 1 glass milk.

10 a.m. Orange juice.

Dinner. Liver soup. Meat or fish, 3½ ozs. Vegetables: potato and root 10 ozs., green ad. lib. Custard or milk pudding, 1 serving. Stewed fruit and sugar, 1 serving. Cream, 1 oz.

3 p.m. Sandwiches with lettuce, yeast extract, or tomato or cheese. Cup of tea.

Tea. Liver, eggs or high vitamin savoury. Salad. Fresh fruit. Three slices bread and butter. Jam, marmalade, honey or yeast extract. Milk.

Supper. Ovaltine.

NON-RESIDUE DIET

Foods allowed: Gelatine, sucrose, dextrose, hard cooked eggs, lean meat, liver, fish (pounded), rice, cottage cheese, Farina, concentrated meat broths.

SAMPLE DIET

Breakfast. Orange or fruit juice (strained). Egg, well cooked. Rice flakes with sugar. Tea and sugar (no milk).

Dinner. Beef tea. Scraped liver patties. Jelly with sugar.

Tea. Fish kedgeree. Jelly and sugar. Tea or coffee with sugar—no milk.

N.B. This diet is inadequate in all food elements except protein.

LOW-RESIDUE DIETS

SAMPLE DIET

A non-residue diet with the following additional foods: white bread, macaroni, butter, cream, milk puddings, fruit purees, vegetable purees, milk (not to exceed one pint), potatoes.

Breakfast. Orange juice, strained porridge, or very fine creamoata. Egg (well cooked, not fried). Fish. Later add lean bacon. Toast (not wholemeal). Rusks. Tea or coffee.

10 a.m. Beef tea or yeast extract. Tea. Water biscuits, sao cracker or toast (not wholemeal).

Dinner. Cream soup or any clear soup. Scraped beef patty, lean meat, chicken, fish, tripe, brains or sweetbreads. Boiled rice or potatoes. Sieved carrot, spinach, cauliflower, etc. Later add whole light vegetables, e.g. marrow, young tender carrots, cauliflower tips and asparagus tips. Jellies and gelatine moulds, cereal pudding, milk sweets. Later add sieved stewed apples, plain steamed pudding. Cream.

3 p.m. Tea or coffee. Toast (not wholemeal), rusks, fairy toast, plain biscuits (water biscuits or sao crackers).

Tea. Meat, fish or egg dishes. Jelly, cereal puddings. Sieved stewed apples. Toast (not wholemeal), rusks, fairy toast, plain biscuits (as above). Butter, or cottage cheese, honey, yeast extract, strained jam, jelly. Tea or coffee. Rose hip syrup taken when oranges not available.

Avoid the Following:

Pips and skins. Raw fruit and vegetables. Cabbage. Highly seasoned foods. Twice cooked foods. Fried foods.

This diet is adequate in most food constituents, but in cases in which absorption is impaired, it is advisable to reinforce the diet with concentrates of minerals and vitamins.

The residue of this diet can be greatly decreased by omitting milk in which case calcium medication is essential.

Undesirable Foods. All foods except those specifically listed.

CHRONIC ULCERATIVE COLITIS—STAGE A

APPROXIMATE ANALYSIS:

Calories: 1700	Carbohydrate: 205 gms.
Protein: 70 gms.	Fat: 62 gms.

SAMPLE DIET

Breakfast. Lemon juice 2 oz. and glucose 1 oz. with water. Strained cereal, 4 oz. cooked weight. Egg 1, grilled bacon. Fairy toast, ½ slice with honey. Cream ½ oz. Milk 8 oz.

10 a.m. Liver soup.

Dinner. Fish 4 oz. with rice ½ oz. Fairy toast, ½ slice. Orange jelly (orange juice 4 oz. with 2 tablespoons sugar and gelatine). Cream ½ oz.

3 p.m. Cup of tea and a piece of fairy toast.

Tea. Fish, or scraped beef or chicken, 4 oz. Rice ½ oz. Fairy toast, ½ slice with honey or yeast extract. Cereal pudding made with cereal ½ oz., milk 4 oz., egg 1, and sugar, 1 tablespoon.

7 p.m. Milk, 8 oz. made into beverage. Butter ration ⅓ oz.

CHRONIC ULCERATIVE COLITIS—STAGE B

APPROXIMATE ANALYSIS:

Calories: 2800	Carbohydrate: 303 gms.
Protein: 134 gms.	Fat: 114 gms.

SAMPLE MENU

On rising. Glass of tomato juice.

Breakfast. Egg 1, or fish (steamed or boiled). Grilled bacon. Strained porridge, ½ cup with wheat germ. Fairy toast, one slice with jelly, honey, etc.

10 a.m. Liver soup. Ripe banana.

Dinner. Scraped beef or chicken or fish, 3 oz. Potato puree, ½ cup; vegetable puree, e.g. carrot, ½ cup. Custard (egg 1, milk 4 oz., skimmed milk powder ½ oz.). Cream 2 tablespoons, and fruit puree 4 oz.

3 p.m. Fairy toast, one slice with jelly or honey or yeast extract, etc.

Tea. Eggs 2, or fish etc. with potato puree, 2 oz. Cereal pudding (4 oz. milk, ½ oz. cereal and ½ oz. skimmed milk powder). Fairy toast, one slice with jelly or honey, etc. Orange juice, 3 oz. with ½ oz. glucose. Butter ration 1½ oz.

In-between Feeds: 20 oz. high protein drink.

N.B.: This diet is adequate in all food nutrients, but because of poor absorption in cases of colitis, avitaminosis is a common feature unless concentrates are ordered by the Physician. It is important that skimmed milk powder and high protein fluid be included in the dietary to maintain this protein level.

TYPHOID DIET

APPROXIMATE ANALYSIS:

Calories: 3000	Carbohydrate: 270 gms.
Protein: 100 gms.	Fat: 170 gms.

SAMPLE DIET

7 a.m. Oatmeal gruel 4 oz., plus 2 teaspoons sugar, plus 2 tablespoons cream Milk 6 oz., plus 2 tablespoons cream.

9 a.m. High protein beverage, 6 oz.

10.30 a.m. Arrowroot pudding 2 oz., plus 2 teaspoons butter, plus 2 tablespoons cream, plus 2 teaspoons sugar. Orange juice ½ cup, plus 2 teaspoons sugar.

12 noon. Coddled egg. Two slices crustless bread, plus 2 teaspoons butter Cereal pudding 2 oz., plus 2 tablespoons cream; milk 4 oz.

2.30 p.m. Ice cream 3 oz. Milk 6 oz. Crustless bread 2 slices, plus 2 teaspoons butter.

5 p.m. One poached egg on half-slice crustless toast, plus 2 teaspoons butter. Milk 6 oz., plus 2 tablespoons cream. Milk sweet 2 oz.

6.30 p.m. Milk pudding, e.g. arrowroot 2 oz., plus 2 teaspoons sugar, plus 2 tablespoons cream and 2 tablespoons milk. Milk 6 oz., plus 2 tablespoons cream.

9 p.m. Egg flip—1 egg, 6 oz. milk, plus 2 tablespoons cream.

During convalescence the diet is very gradually increased according to the appetite and powers of digestion of the patient.

This diet should be suitable for the average patient, but a higher or lower calorie diet may be advisable in certain cases.

Iron and vitamin concentrates should be ordered by Physician.

PEPTIC ULCER—STAGE A

N.B. The actual quantities of food must be ordered by the Physician as individual cases vary greatly in their requirements. In some cases the transition from A. to B. may require to be gradual.

APPROXIMATE COMPOSITION (for maximum quantity):

Calories: 2500	Carbohydrate: 200 gms.
Protein: 90 gms.	Fat: 150 gms.

5.30 a.m. Milk, 5 ozs. and glucose or sugar, 1 teaspoon. Rusk, 1 and butter.

7.15 a.m. Strained porridge and cream, 1 oz. and sugar, 2 teaspoons, **or** egg 1, scrambled, poached or coddled. Rusk, 1 and butter. Milk 5-8 ozs.

8.45 a.m. Egg flip—egg 1, and milk 8 oz., rusk 1 and butter and yeast extract, 1 teaspoon of honey or jelly.

10.30 a.m. Milk, 8 ozs.

12.15 p.m. Cream of vegetable soup (milk, cream, butter, flour and vegetable puree) **or** vegetable puree. Pudding, 4 ozs. (junket, milk jelly, custard, cereal pudding, fruit puree). Cream, 1 oz.

2.30 p.m. Egg flip or Ovaltine or Horlick's or yeast extract in milk, using 8 oz. milk. Rusk, 1 and butter.

4.30 p.m. Crisp toast or rusk 1 and butter, yeast extract, honey, jelly. Cream soup (as at lunch) or pudding (as above).

6.30 p.m. Cocoa, Ovaltine, Horlick's or yeast extract in milk 5-8 oz., Rusk 1 and butter.

8.30 p.m. Egg flip, cocoa, Ovaltine, etc., in milk, 5-8 ozs. Rusk, 1 and butter.

Fruits Allowed. Apple pulp, sieved apricot, peach, pear, etc.

Vegetables Allowed. Old potato, tomato, carrot, parsnip, artichoke, spinach, silver beet, marrow, pumpkin, cauliflower, swede.
All must be free from skin, seeds, etc. and sieved.
Oven dried bread or thin crisp toast may be used instead of rusks.
The milk is not citrated unless this is officially ordered. It may be flavoured with tea, coffee, cocoa, Ovaltine, or malted milk.
No condiments except salt in moderate quantity.

To be taken Daily. Juice of 1 large orange with sugar and water **or** rose hip syrup, 2 tablespoons, well diluted, **or** tomato juice, 8 ozs., yeast extract, 1 teaspoon.

Drinks. When awake during the night take milk drink. Water up to 5 ozs. or glucose and water may be sipped between meals. If patient feels hungry at intermediate hours, 5 ozs. milk may be given.

Mouth. Rinse mouth with dilute Listerine after meals.

PEPTIC ULCER—STAGE B

APPROXIMATE COMPOSITION:

Calories: 2500	Carbohydrate: 260 gms.
Protein: 100 gms.	Fat: 115 gms.

5.30 a.m. Milk, 8 ozs. Rusk, 1 and butter.

7.15 a.m.: Breakfast. Strained porridge and cream or milk. 1 egg, poached, scrambled or coddled, **or** sieved fruit and cream **or** milk. Crisp toast or oven-dried bread and butter. Yeast extract, jelly, marmalade or honey.

10 a.m. Milk, 8 ozs. and orange juice from 1 medium orange, plus 1 teaspoon glucose or sugar or rose hip syrup, 1 tablespoon.

12.15 p.m.: Dinner. Two small courses selected from: fish, steamed, baked in milk, fish custard or souffle. Brains. Tripe (no onions). Sweetbreads. Rabbit. Chicken (breast and wing). Pureed vegetables, e.g. carrot, tomatoes, potatoes, asparagus tips, silver beet, spinach, artichoke, parsnips, marrow.

Pudding (junket, milk jelly, cereal pudding, custards, etc. Light sponge pudding, fruit whips, ice cream).

2.30 p.m. Egg flip, milk, 8 ozs., egg, 1 **or** any milk drink. Rusk and butter with yeast extract, jelly or honey **or** sao crackers and butter **or** plain sponge cake.

4.30 p.m.: Tea. Two courses selected from: fish as at lunch **or** 1 egg, coddled, scrambled or poached or omelette, **or** potato souffle, or other sieved vegetables, souffle or custards. Pureed fruit and cream or custard. Crisp toast or rusks or stale bread and butter.

6.30 p.m. Egg flip, milk, 8 ozs., egg, 1 **or** any milk beverage. Rusk or crackers and butter.

8.30 p.m. Milk, 8 ozs.

Milk to be drunk if patient wakens, and **extra milk can be taken at any time patient feels hungry.**

Fluids between meals as at Stage A. 4 ozs. orange juice or 2 tablespoons rose hip syrup to be taken daily

1 teaspoon yeast extract or 1 oz. wheatgerm should be taken daily.

Analysis approximate only as values will vary according to patient's appetite and quantities consumed.

POST-ULCER REGIME—STAGE C

THE FOLLOWING ARE ALLOWED:

Milk and Eggs. Milk prepared in any way. Junket, custard, milk jelly, well cooked milk puddings, milk soup. Plain cream, ice cream, cream soups, cream jellies. Butter ad libitum. Eggs lightly cooked, omelettes, poached, scrambled, coddled. Egg flips (no alcohol).

Fish and Meat. Fish boiled, steamed, baked in milk (not fried). Fish custard and fish souffle. Rabbit, tripe, brains, sweetbreads. Chicken, lamb or mutton occasionally. (**Avoid** outside slices and meat fried or stewed).

Vegetables. Potatoes well cooked and mashed. Cauliflower, spinach, carrots, artichokes, parsnips, silver beet (well cooked and sieved). Tomatoes, fresh or cooked and rubbed through a sieve. (**Avoid** salads, cabbage, or any stalks of vegetables).

N.B. Young carrots, cauliflower tips, marrow and asparagus tips may be taken whole.

Fruit. Apple sauce, baked apples, without skin, ripe or baked bananas, diluted fruit juices, stewed or canned pears, nectarines, peaches and apricots (all to be peeled). Puree of all dried fruits, except figs. Strained orange juice or tomato juice.

Miscellaneous. Thin stale white or wheatgerm bread or crisp toast or oven-dried bread. Any smooth biscuits. Plain sponge or Madeira cake without fruit. Fruit jellies, plain chocolate, sugar, honey, golden syrup, jelly, jam or marmalade jelly. (**Avoid** all jam with seeds or skins).

Fluids. Milk beverages basis of diet. Strained fruit juices, orange juice, 4 ozs. or substitute, 2 tablespoons rose hip syrup (diluted) daily. Yeast extract daily in milk and soups. Drink sparingly with meals—fluids ad libitum between meals.

FOODS AND DRINKS FORBIDDEN

Fish. Avoid salmon, sardines, dried or smoked fish.

Soups. Avoid clear or thick meat soups. **Condiments:** avoid spice, pepper, chutney, curry, pickles, relish, mustard, vinegar.

Vegetables. Avoid cabbage, peas, beans, celery, onion, watercress, lettuce, cucumber. Other vegetables must be passed through a sieve. Young peas pureed or cream of pea soup are allowed.

Fruit. Avoid all raw fruit except ripe bananas and fruit juices.

Miscellaneous. Rich pastry or puddings, new bread, brown or wholemeal bread, fruit cakes. No aerated drinks. No alcohol at present—later white wine or whisky and water may be taken cautiously. Smoking should be very moderate and only immediately after meals. Fried foods in any form.

GENERAL INSTRUCTIONS

1. Take meals regularly—if possible resting $\frac{1}{4}$ hour before and after meals.
2. Large meals must never be taken—always have a snack in mid-morning and afternoon, and supper at bedtime. Milk may be taken at any time if hungry. Carry suitable food when travelling.
3. Avoid taking a meal when tired and cold.
4. Eat and chew thoroughly and visit the dentist at regular intervals.
5. Avoid chills and go to bed if you get a cold or influenza. Reduce your diet and remain in bed until recovered.
6. Take butter and cream ad libitum—olive oil before meals is good for those who can tolerate it.
7. Keep early hours and take drugs ordered by Physician regularly.
8. Lead a placid life and avoid worry.

9. Remember complete healing of your ulcer is a long process and relapse can occur suddenly after dietetic or other indiscretion.
10. Exercise should not induce undue fatigue and must not involve any pressure on the abdomen.
11. If pain returns, at once reduce diet and, if response is not rapidly satisfactory, call in your Physician.

SAMPLE MEULENGRACHT'S DIET

Calories: 2400 Protein: 90 gms.
Carbohydrate: 200 gms. Fat: 140 gms.

8 a.m. Orange juice. Strained cereal and cream. Toast and butter.

10 a.m. Egg nog—Sao Cracker and butter.

12 noon. Minced meat. Mashed potato. Vegetable puree. Toast and butter. Fruit puree. Milk. Cream. Orange juice.

2 p.m. Egg nog.

4 p.m. Cocoa.

6 p.m. Cottage cheese or minced meat. Bread and butter. Pudding. Cream. Milk. Orange juice.

8 p.m. Egg nog.

ALKALINE-PRODUCING FOODS

Almonds	Gooseberries	Asparagus	Onions
Apples	Grapefruit	Beans	Parsnips
Apricots	Lemon	Beet	Peas (dried)
Bananas	Loganberries	Cabbage	Peas (green)
Blackberries	Nectarines	Carrots	Potato
Brazil nuts	Oranges	Cauliflower	Pumpkin
Cherries	Pineapple	Celery	Radishes
Coco-nuts	Pears	Cucumber	Spinach
Currants	Raspberries	Lettuce	Turnips
Dates	Strawberries	Milk	Tomatoes
Figs		Mushrooms	Squash

NEUTRAL-PRODUCING FOODS

Cream	Cheese	Arrowroot	Candy (plain)
Sago	Cornflour	Butter	Tapioca
Sugar			

ACID-PRODUCING FOODS

Eggs	Tripe	Prunes	Cereals
Meat	Sweetbreads	Cranberries	Whole wheat
Fish	Barley	Corn	Oatmeal
Poultry	Plums	Bread	Rice

MODIFICATION OF ACID ASH DIET TO SUIT NEW ZEALAND CONDITIONS

		Excess Base	Excess Acid	Calories	
Oatmeal	1 cup cooked		6.4	158	
Wheatgerm	2 Tablespoons		11.0	158	
Egg	1 (optional)		5.5	(79)	
Bacon or ham	2 ozs. (optional)		2.1	(230)	
Toast (wholemeal)	2 or 3 slices (or fried bread)		4.6 (6.9)	148	
Butter ration for day	$1\frac{3}{8}$ oz.			258	
Sugar for day (ration allowance)				180	
Meat, include fat (ration allowance)			24	258	
Boiled rice or alternative*	1 cupful		3.8	136	
Soup (made as directed)					
Bread with soup	2 slices		4.6	148	
Potato	$\frac{1}{2}$ cup	6.5		85	
Cauliflower	$\frac{1}{2}$ cup	3.7		22	
Cream sauce, using part of day's milk allowance and $\frac{1}{2}$ oz. flour			1.1	50	
Day's milk allowance (more can be used if it is made into cream cheese or into junket without the whey)	1 pint	16.2		396	
Cheese	1 oz. or more		1.5	120	
Bread (wholemeal)	3 or more slices		6.9	222	
Dripping can be used on bread	$\frac{1}{4}$ oz. would furnish			85	(Oil can be used for salads)
Honey, or plum jam, or marmalade, or lemon curd (or peach or apricot jam in limited amounts)					
Rose hip syrup	2 tablespoons			124	
Cod liver oil	1 teaspoon			27	(or halibut oil or Adeol, etc.)
		26.4	71.5	2575	
On this basis, could easily allow more milk or more potato to increase the calories.					Plus bacon or ham .. 2805 Plus egg 2894
Additional half pint milk		8.1		198	
Potato	$\frac{1}{2}$ cup	6.5		85	Plus extra milk and potato 3177
		41			

Could make a rule that for every additional 2 slices of wholemeal bread it would be safe to take an extra $\frac{1}{4}$ pint of milk or $\frac{1}{2}$ a medium potato.
Fat from the roast can be used on potato to increase the calories.

* Foods suitable for supplying extra calories at the main meal in addition to specified lists of meats and vegetables:—Yorkshire pudding (no rising), macaroni custard or cheese, custard sauce, custard tart, pancakes (made with eggs but not baking powder), shortbread, stewed prunes, jelly, pastry, blanc mange or tapioca pudding, sponge cake (made with eggs but no baking powder), steamed pudding (made with eggs and only small amount of baking powder). For those foods requiring milk, use part of the milk allowance.
Soups to be made with meats or bones, barley, rice, flour or oatmeal, parsley, and a limited quantity of other vegetables.

A diet containing a preponderance of acid producing foods, or a normal diet, prescribed with a calculated amount of acid, i.e. ammonium chloride checked against the reaction of the urine.

ALKALINE ASH DIET

A diet containing a preponderance of alkaline producing foods **or** a normal diet, with a calculated amount of potassium citrate checked against the reaction of the urine.

N.B. Physician to make his own choice.

SAMPLE DIET

APPROXIMATE COMPOSITION:

Calories: 2000	Carbohydrate: 282 gms.
Protein: 55 gms.	Fat: 82 gms.

Breakfast. 1 glass orange juice (3 ozs. juice, diluted if liked). 1 Baked apple, 4 ozs. Cream, 1 oz. ½ slice toast, 1 oz. Butter, ½ oz. 1 glass milk, 8 ozs. Marmalade.

Dinner. 1 cup vegetable soup. Potato, 3 ozs. (cooked any way). 1 cup vegetables from list, 7 ozs. Raw or stewed fruit, 5 ozs. **or** banana, 2½ ozs. ½ slice bread. Butter ⅓ oz. 1 glass milk, 8 ozs.

3 p.m. 4 ozs. Ice cream. 1 glass orange juice (3 ozs. juice, diluted if liked).

Tea. Potato, 3 ozs. Butter, ⅓ oz. Vegetable salad or cooked vegetables, 4 ozs. Bread, ½ slice. Butter, ⅓ oz. 1 glass milk, 8 ozs. Raw or stewed fruit, 4 ozs.

8 p.m. 1 glass orange juice (3 ozs. juice, diluted if liked). Banana, 2½ ozs. **or** 5 ozs. other fruit.

OXALATE-FREE DIET

Foods with high oxalic acid content and to be avoided are:

Cocoa	Fig (Dried)	Strawberry
Chocolate	Rhubarb	Tomato
Black Tea	Potato	Beet
Coffee	Bean	Celery
Sorrel	String Bean	Grapefruit
Spinach	Gooseberry	
Silver Beet	Plum	
In moderation:		
Bread	Muscle Meats	Liver, Sweetbreads
Cereals		
Liberal amounts of:		
Milk	Peas	Asparagus
Cheese	Rice	Mushrooms
Eggs	Cabbage	Apricots
Butter, etc.	Cauliflower	Grapes, Melons

SAMPLE OXALATE FREE DIET

APPROXIMATE COMPOSITION:

Protein: 94 gms.	Fat: 128 gms.
Carbohydrate: 250 gms.	Calories: 2500

Breakfast. Stewed fruit (no gooseberries, plums or grapefruit) or porridge. Egg 1, and bacon 1 oz. Bread 1 slice (1 oz.), butter ½ oz., honey or marmalade.

Mid-morning. Milk or egg flip 8 oz., fresh fruit 4 oz.

Dinner. Cream soup 5 oz. Small serving of meat or chicken, sweetbread etc. 2 oz. Cabbage or cauliflower or asparagus or peas (or any vegetable not listed). Milk pudding, e.g. custard. Stewed fruit, e.g. apricots, peaches, apples, etc. Cream.

Mid-afternoon. Milk or weak tea 8 oz. with biscuits or cake, scone or pikelet, etc.

Tea. Bread 1 oz., butter ½ oz., jam (no plum or gooseberry), honey. Eggs 2, or cheese dish or meat, e.g. grilled steak or chops, fish, etc. in moderation. Salad (omitting listed vegetables) 3½ oz. Weak tea with milk. Fresh fruit 4 oz. (see list).

Supper. Egg flip or milk 8 oz., with biscuit or cake, etc.

To be ordered: Vitamin B concentrates.

ATONIC DYSPEPSIA

APPROXIMATE ANALYSIS:

Calories: 1400	Carbohydrate: 110 gms.
Protein: 70 gms.	Fat: 75 gms.

Breakfast. Orange or tomato juice (diluted) 3 oz. Egg or fish or strained porridge. Rusks, fairy toast, or day-old bread. Butter.

11 a.m. A milk beverage, e.g high protein drink.

Dinner. Fish or tender meats. Sieved vegetables and butter. Small amount mashed potato. Junket or other milk sweet.

3 p.m. Water flavoured with lemon juice, 3 ozs.

Tea. Crisp toast and butter. Cream cheese. Egg or fish dish. Sieved vegetables (small serving).

8 p.m. Milk. Plain biscuits.

The following should be avoided:

Fluids and solid food at the same time.
Alcohol, unless well diluted.
Soups, gravies, coffee, strong tea.
Pips and skins of fruits (raw, cooked, or in jam).
Raw vegetables.
Fresh bread, scones, heavy puddings.
Condiments, spices and pickles.
Pork, game, sausages, pies, etc.
Twice-cooked foods.

Take liberally:

Milk, cream, butter, eggs. Orange juice, lemon juice or tomato juice should be taken daily. If not tolerated, 2 tablespoonsful of rose hip syrup should be taken, diluted in water.

General Directions:

Eat slowly and chew thoroughly.
Take meals regularly, punctually and leisurely.
Rest whenever possible for half an hour after meals.
Avoid excessive smoking.
Guard against constipation.

N.B. As the patient improves the calories should be increased.

COELIAC DISEASE

Protein: High, in form of egg white, scraped beef or minced beef, minced liver, pounded chicken or fish, twice daily. Milk should be skimmed by separator. Skimmed milk powder is suitable, especially for cooking.

Carbohydrate. Moderate, crisp dry toast, water biscuits or rusks.

Vegetables. Potato, marrow, sieved spinach or cauliflower or tomato puree, etc.

Fruits. Strained orange juice, apple pulp or raw apple rubbed through a sieve. Well-ripened banana thoroughly mashed may be given daily.

Fats. Very low—are usually cut out completely to commence with. Later allow an egg two or three times a week. Butter not allowed at first and later only in very small amount. Milk fat is the last to be tolerated, so keep on skimmed milk for a longer period.

SAMPLE DIET

Early Morning. Juice of an orange.

Breakfast. Strained oatmeal, Vimax or Farex and skimmed milk. Crisp dry toast or rusk with yeast extract or honey. Eggs 2 or three times a week if tolerated. Skimmed milk to drink.

11 a.m. Drink of skim milk.

Dinner. Minced or scraped beef, pounded chicken or fish. Little potato, sieved spinach or tomato puree. Stewed apple (sieved) or over-ripe mashed banana. Junket made with skimmed milk or milk jelly.

Tea. Minced beef or liver or fish. Crisp dry toast with honey or yeast extract. Skimmed milk to drink. Mashed banana.

Supper. Drink of skimmed milk.

Yeast Extract. 1 teaspoon daily or concentrates of B complex.
Vitamins A and D also given in concentrated forms.
Vitamin C as rose hip syrup, 3 tablespoons daily.

CHOLECYSTITIS

APPROXIMATE ANALYSIS:

Calories: 2000	Carbohydrate: 270 gms.
Protein: 83 gms.	Fat: 66 gms.

SAMPLE MENU

On rising. Glass sweetened lemon juice.

Breakfast. Stewed fruit and Weetbix. Egg 1 or fish and tomato 1 serving (steamed, not fried). Milk from ration. Bread and jam or marmalade. Butter from ration.

10 a.m. Glass sweetened fruit juice.

Dinner. Lean meat, 1 serving. Vegetables (non-flatulent) 4 oz. Potato 3 oz. Stewed fruit and cereal pudding.

3 p.m. Cup tea with 1 slice bread or plain biscuit.

Tea. Lean meat or substitute 1 serving. Salad, tomatoes, vegetable savoury, etc. Bread 3 slices, jam, butter from ration. Raw fruit.

7 p.m. Milk beverage.

Day's Ration. (1) Butter ⅔ oz. (2) Milk 20 oz. (3) Boiled glucose sweets 1 oz. (4) Egg 1.

N.B.: If a further restriction of fat is required, the milk will have to be skimmed and the butter restricted further, or omitted. In acute stage a more bland diet is required; fruits and vegetables should be sieved.

Foods to Avoid:

1. All fried foods.
2. Foods that cause flatulence, i.e. cabbage, cauliflower, onions, etc.
3. All twice-cooked and highly-seasoned meats.
4. Rich desserts and pastries.
5. Cream, meat fat, oils, salad dressing.
6. Cocoa, chocolate.

HEPATITIS

Acute Stage:

A fluid diet should be prescribed consisting of copious glucose fluids together with up to 2½ pints reconstituted dried skimmed milk.

APPROXIMATE COMPOSITION:

Fluids: 5-6 pints. Glucose: 200-300 gms. Skimmed milk: 2½ pints.

N.B.: This diet would be suitable also in cases of **Acute Cholecystitis.**

Subacute Stage:

APPROXIMATE ANALYSIS:

Calories: 2000	Carbohydrate: 400 gms.
Protein: 80 gms	Fat: 20 gms.

SAMPLE DIET

On rising. Glucose fruit drink.

Breakfast. Bread 1 slice with jelly, marmalade, honey. Porridge or breakfast cereal. Milk from day's ration.

10 a.m. Glucose fruit drink.

Dinner. Lean meat or fish or chicken, etc. One serving potato. One small serving pureed vegetables. One serving cereal pudding.

3 p.m. Milk beverage from ration. Bread 2 slices with honey or jelly.

Tea. Bread 2 slices with honey or jelly. One serving of stewed fruit. Barley sugar. Milk from day's ration.

7 p.m. Glucose fruit drink.

Day's Ration: Half-pint whole milk. Two pints skimmed milk. Sugar, jam, barley sugar. Glucose 3½ oz. for fruit drinks. Bread stuffs, fruits, and vegetables as desired.

Avoid 1. All fried foods.
2. All foods rich in fat, i.e. butter, cream, eggs, bacon, cheese, etc.
3. All foods which are indigestible.
4. Cocoa, chocolate, strong tea, coffee, condiments and spices.

N.B.: As condition improves, increase protein intake to 100-120 gms, and fats according to patient's tolerance.

CIRRHOSIS OF LIVER

APPROXIMATE ANALYSIS:

Protein: 141 gms. (half from meats)
Carbohydrate: 307 gms.
Fat: 60 gms.
Calories: 2500

Calcium: 1.73 gms.
Iron: 22 mgs.
Vitamin A: 16,000 I.U.
Thiamin (B1): 2,600 I.U.
Riboflavin: 4,700 I.U.
Nicotinic Acid: 39 mgs.
Ascorbic Acid: 155 mgs.
Vitamin D: 40 I.U.

Breakfast. Porridge (from ½ oz. dry weight of oatmeal). Milk, skim, on porridge and in coffee. Liver or kidney and bacon (lean only). Bread, 2 slices.

Mid-morning. Broth or vegetable soup.

Dinner. Meat, lean, 3½-4 ozs. Potato, 7 ozs. Green vegetables, e.g., cauliflower, 3½ oz. Peas, 3½ oz. Apple, stewed, 3½ oz. Blanc mange. Coffee made with skim milk.

Mid-afternoon. Tea, bread and butter, thinly spread.

Tea. Fish, steamed 6 oz. (non-fatty fish). Bread, 3 slices, thinly spread with butter. Honey or jam. Fruit. Milk or cocoa or tea with milk.

Vitamin addition as given below brings the thiamin intake up to 13 mgs., the Vitamin A up to 36,000 I.U. and Vitamin D up to 2,000 I.U.

Daily Quota of Foods:

Oatmeal ½ oz. Milk (skim) 2 pints. Liver or kidney (or other meats) 2 oz. Bacon (lean) 2 oz. Meat (lean) 4 oz. Fish (non-fatty) 6 oz. Bread 6 oz. Potato 7 oz. Green vegetables 3½ oz. Other vegetables 3½ oz. (especially peas, beans or lentils). Fruit, at least 4 oz. Butter up to 1 oz. Sugar or honey or jam, 1½ oz. or more.

Vitamin Supplements:

Adeol 5 minims t.d.s., or some other concentrate to provide 20,000 I.U. of A and 1000 or 2000 I.U. of D. Thiamin hydrochloride 2 mgs. three times a day. Rose hip syrup 2-4 tablespoons per day (or equivalent in other fruit juice rich in Vitamin C). Brewer's yeast 30-50 gms. a day. Liver extract, e.g. Campolon intramuscularly, 3-5 cc two or three times a week. Sometimes nicotinamide.

MACROCYTIC ANAEMIA

Most cases will do well with a full well-balanced diet in association with anti-anaemic therapy. Some patients, however, will react better if a detailed diet is given, such as the sample diet shown.

APPROXIMATE ANALYSIS:

Carbohydrate: 350 gms.	High Iron	
Fat: 100 gms.	High Vitamin C	
Calories: 2,600	1 teaspoon cod liver oil	} daily
Protein: 98 gms.	1½ pints milk	} daily

Foods to be included as much as possible:

Liver	Sweetbreads	Dried Beans
Lentil	Raisins	Green Vegetables
Treacle	Dried Fruits	Oatmeal
Eggs	Beef	Wholemeal
Parsley	Kidney	Whole Cereals
Beef Juice	Oysters	Cocoa
Dried Peas	Lima Beans	

SAMPLE DIET

On Rising. 1 glass orange juice, or rose hip syrup, 1 tablespoon daily.

Breakfast. Eggs **or** liver **or** kidney and bacon. Porridge (oatmeal or Vimax). Wholemeal bread and butter. Syrup or treacle. Milk. Cocoa.

10 a.m. Beef tea or raw fruit.

Dinner. Meat **or** liver **or** sweetbreads. Green vegetables, especially kale or spinach, peas or root vegetables. Potatoes (preferably in jackets). Stewed fruit, especially dried apricots, peaches, figs, prunes. Treacle pudding. Milk puddings with eggs, e.g., custard.

3 p.m. Tea, treacle on date scones, wholemeal sandwiches.

Tea. Liver or kidney soup. Meat or liver or cheese and egg dish **or** salads with raisins, prunes, etc. Wholemeal bread, butter, treacle or syrup. Milk beverages. Orange or raw fruit.

OBESITY DIET A

1000 Calories

Protein 70 gms. Carbohydrate 98 gms. Fat 38 gms.

SAMPLE MENU

a.m. Bread 1 oz. (1 small slice). Egg 1, or equivalent. Raw fruit, e.g. grapefruit (no sugar), or unsweetened stewed fruit, 4 oz. Coffee made with skimmed milk from ration.

10 a.m. Cup of tea. Nothing to eat.

Noon. Lean meat, e.g. beef, 4 oz. Green vegetables, large serving. Root vegetables 2 oz. Raw fruit, e.g. orange or peach, 4 oz. Coffee or tea made with skimmed milk from ration.

3 p.m. Cup of tea. Nothing to eat.

p.m. Bread 1 oz., (one small slice). Egg 1, or meat or fish 1 oz. Salad, e.g. lettuce, tomato, etc. Raw fruit, e.g. apple, 4 oz. Tea with milk from ration.

Day's Ration: One pint skim milk, ¼ oz butter.

N.B.: 1. No food to be cooked with sugar.

2. Weight of fruit on diet sheet is for edible portion of fruit, except for following when half stated amount is used: figs, prunes, dried apricots, grapes, bananas.

3. No food is to be cooked in fat.

Adeol 3 drops, or other concentrate of Vitamins A and D to be taken daily.

OBESITY DIET B

1300 Calories

Protein 75 gms. Carbohydrate 126 gms. Fat 50 gms.

SAMPLE MENU

a.m. Bread 1 oz., (one small slice). Egg 1, or equivalent. Raw fruit, e.g. grapefruit or unsweetened stewed fruit, 5 oz. Coffee or tea made with skim milk from ration.

10 a.m. Cup of tea. Nothing to eat.

Noon. Lean meat 4 oz., Green vegetables, (large serving). Root vegetables 2 oz. Potato 2 oz. Raw fruit, e.g. orange or peach, 5 oz. Coffee or tea made with skim milk from ration.

3 p.m. Cup of tea. Nothing to eat.

p.m. Bread 1½ oz. (1½ small slices). Egg 1, or fish or meat 1 oz. Cheese ½ oz., (half-inch cube). Salad, e.g. lettuce, tomato, etc. Raw fruit, e.g. apple, 5 oz. Tea with milk from ration.

Day's Ration: One pint skim milk, ½ oz. butter.

N.B.: 1. No food to be cooked with sugar.

2. Weight of fruit on diet chart is for edible portion of fruit, except for the following, when half stated amount is used: figs, prunes, dried apricots, grapes, bananas.

3. No food to be cooked in fat.

Adeol 3 drops, or other concentrate of Vitamins A and D to be taken daily.

OBESITY DIET C

For Maintenance Only — Calories 1500

Protein 77gms. Carbohydrate 150 gms. Fat 70 gms.

SAMPLE MENU

a.m. Bread 1½ oz., (1½ small slices). Egg 1, or equivalent. Raw fruit, e.g. grapefruit (no sugar) or unsweetened stewed fruit, 6 oz. Coffee made with milk from ration.

10 a.m. Cup of tea. Nothing to eat.

Noon. Lean meat, e.g. beef, 4 oz. (large serving). Green vegetables, large serving. Root vegetables, 2 oz. Potato, 3 oz. Raw fruit, e.g. apricot or orange, 6 oz. Coffee or tea made with milk from ration.

3 p.m. Cup of tea. Nothing to eat.

p.m. Bread 1½ oz. (1½ small slices). Egg 1, or meat or fish 1 oz. Cheese ½ oz., (half-inch cube). Salad, e.g. lettuce, tomato. Raw fruit, e.g. apple, 6 oz. Tea with milk from ration.

Day's Ration: One pint milk, ½ oz. butter.

N.B.: 1. No food to be cooked with sugar.

2. Weight of fruit on diet chart is for edible portion of fruit, except for the following, when half stated amount is used: figs, prunes, dried apricots, grapes, bananas.

3. No food to be cooked in fat.

Adeol 3 drops, or other concentrate of vitamins A and D to be taken daily.

FOOD ALLERGY

Successful handling of food allergy demands absolute co-operation on the part of the patient.

METHODS OF DETERMINING FOOD SENSITIVITY

History. A full nutritional history is sometimes helpful in determining allergic factor.

Skin Tests. Not conclusive.

Food Diary. A study of food habits as related to symptoms, prior to starting on an elimination diet.

Therapeutic Elimination of suspected foods as determined by patient's history or food diary—or, if no conclusion reached, put on basic diet which eliminates all commonly suspected allergic foods.

GENERAL INSTRUCTIONS

At the end of two weeks, which may be extended to three, if symptoms persist, one or other of the foods not previously allowed may now be taken. It is best to begin with fruit and vegetable, say banana, orange, potato.

After three days if there is no return of symptoms, other food is added, and so on every three days until symptoms do return. Foods which cause return of symptoms will be avoided entirely, or at any rate for many months.

If desired, milk may be tried out early, but preferably not for three or four weeks.

The order of preference is: potato, orange, banana, cabbage, apple, wheat, eggs, milk—but it is not necessary to keep strictly to this order in individual cases.

Common Offending Foods are:

Wheat in any form. Milk and milk foods. Eggs in any form. Apples. Tomatoes. Potatoes, cabbage, cauliflower, peas, beans, lettuce, honey, bananas, oranges, strawberries, plums. Pork, bacon, fish, ham, beef. Chocolate, cocoa.

DIABETIC DIETS

Diabetic Diets are of two types:

I. Qualitative.
II. Quantitative.

Each Quantitative Diet is prescribed by the Medical Officer according to the individual needs of the patient.

The number of grams of protein, carbohydrate and fat must be definitely specified, together with the type and amount of insulin being administered.

N.B. Any change in type of insulin used should be notified to the Dietary Department.

GENERAL RULES

Calories. Depends on weight. In average person 25-30 calories per kilogram (basal). 30-40 calories per kilogram (maintenance). **Child 1-5 years varying 100-70 calories per kilogram.**

N.B. A diabetic patient on discharge should be stabilised on a diet of sufficient calories to meet his energy requirements—according to his occupation.

Protein. 1 gram per kilogram body weight, adult. **Child 1-5 years, 2-3 grams per kilogram.**

Carbohydrate:

The specific type of insulin in use should always be stated on diet sheet, as carbohydrate division depends on whether plain or protamine zinc insulin is given.

e.g. If protamine zinc insulin used, diet must provide a "carbohydrate meal" (of say 20 gms.) before retiring, as this prolongs the carbohydrate availability and helps to prevent nocturnal or early morning hypoglycaemic coma.

Fat. To make up the calories.

LIQUID DIABETIC DIET

If a liquid diet is ordered, unless otherwise stated **carbohydrate only** will be calculated.

Food Refused. If a diabetic patient refuses any part of his diet, this fact should be reported to the Dietitian immediately and she will calculate the carbohydrate quantity refused.

DIABETES—QUALITATIVE DIET

Group 1: Foods Freely Allowed:

a. **Small or average helpings** of all animal foods such as beef, veal, mutton, pork, bacon, ham, liver, kidney, tripe, etc. Eggs, poultry, game, fish, shell-fish, cheese, gelatine. Fats, such as meat fats, butter, cream, olive oil, dripping suet, must be taken in strict moderation.

b. **Unlimited amounts** of the following vegetables, fruits and drinks.

Vegetables. Asparagus, green artichokes, Brussels sprouts, cabbage, cauliflower, mushrooms, celery, cress, cucumber, French beans, lettuce, marrow, pumpkin, radishes, scarlet runners, spinach, tomato.

Fruit. Black or red currants, lemons, stewing gooseberries, rhubarb.

Drinks. Water, soda water, weak tea or coffee (without sugar), thin clear soup, or broth, yeast extract or Bovril, fresh lemon.

Group 2: Foods Allowed in Moderation:

Three tablespoons per meal of **one** of the following vegetables or fruit.

Vegetables. Carrots, leeks, onions, turnips, Jerusalem artichokes.

Fruit Stewed. Apples, apricots, blackberries, cherries, pears, plums.

Fruit Fresh. One orange **or** small apple **or** peach **or** plum **or** half grapefruit or almonds 12, walnuts 6, Brazil nuts 6, raspberries, strawberries.

Group 3: Restricted Foods:

These contain large proportions of sugar or starch and **must not** be taken in larger amounts than stated here.

Bread. 3 oz. daily

Milk. $\frac{1}{2}$ to $\frac{3}{4}$ pint daily, in the majority of dietary prescriptions—

or **one** of the following **in place of** 1 oz. of bread:

Potato, average size (say 3 oz. cooked).

Oranges 2, $\frac{1}{4}$ lb. apple **or** pear, peaches or plums.

Oatmeal, rice or tapioca, 2 dessertspoons, dry weight.

Water biscuits, 6 **or** 3 Sao crackers.

Additional Information. Malted drinks such as beer or stout; also cider, port, sweet wines, and aerated drinks such as lemonade, ginger beer and ale, contain considerable amounts of starch or sugar and are **not allowed.**

Of the spirituous drinks, whisky, brandy, gin or rum are allowed in small amounts.

Flavouring materials, essence of lemon, cloves, coffee, lemon juice, lemon peel, orange peel, parsley, sage, vanilla are allowable.

No flour or sugar must be used in cooking. Saccharine tablets may be used as desired for sweetening. When cooking add the saccharine at the end of the period of heating.

Most so-called "diabetic foods" are of unknown composition and may contain starch. They are better avoided.

OUTPATIENT TREATMENT FOR DIABETICS

A Diabetic when first seen in the Outpatients' Department is given a qualitative diet for a week and the patient is instructed to test the urine twice daily, submitting a record for one week to the clinic. If at the end of this period the urine is sugar free, the patient remains on a qualitative diet with weekly surveillance.

The more serious cases are admitted to Hospital for investigation and stabilisation .

Each outpatient is given the following cards of instruction:

CARD 1

Ward:.....

Insulin Plain Z.P.

Morning

Evening

Diet Pr. Ch. F.

Report to your own Doctor or to the Clinic not later than one week after discharge from Hospital. Take with you your syringe, insulin, diet sheet, a record of your twice daily urine tests, in addition to this card.

Urine Testing: Benedict's Test for Sugar:

1. Place 8 drops of urine in a test tube.
2. Add 1½ inches of Benedict's solution (blue solution).
3. Place in boiling water for 5 minutes.
4. Cool for 3 minutes.

If solution remains **blue** there is no sugar present.

If solution turns **green** with a slight yellow deposit there is a small amount of sugar present.

If solution turns **yellow** with a heavy yellow deposit there is a moderate amount present.

If solution turns **brick red** there is a large amount of sugar present.

CARD 2

Diabetes is not a disease caused by germs or cancer and is neither infectious nor painful. It is dependent on a disorder of a gland behind the stomach called the pancreas or sweetbread. Among the more immediate causes of this disorder are over-eating and obesity, and to be normal or slightly under-weight helps in the prevention of diabetes. This gland, the pancreas, manufactures a substance responsible for the burning of the sugar in the blood and tissues and the production of energy. In the disorder known as diabetes this substance is lacking, the sugar is unburnt and partly accumulates in the system, and partly passes out in the urine.

Until 1923 diabetes in **severe** cases was a fatal disease. However a substance termed **insulin** was then discovered, which is identical in its action to the natural secretion of the pancreas gland, and which when given by injection overcomes any deficiency due to disorder of the gland. Patients ask "Will insulin cure me?" Insulin cures diabetes as food cures hunger. Hunger recurs after a few hours and the need for insulin also recurs. A wooden leg enables a lame man to walk but not to grow a new leg—when the artificial leg is removed he falls to the ground.

Every diabetic patient must realise that he can with modern treatment lead a happy and useful life, **but** that his health lies mainly in his own hands and depends on a thorough understanding of his treatment—and on his own care and persistence. Half-hearted treatment is no use and after preliminary instruction the patient must mainly look after himself, for he cannot at every moment be dependent on his doctor. At first the difficulty of maintaining a rigid diet or the necessity of giving injections is immense but practice and perseverance make everything easy.

Diabetes then can be arrested and health restored:

1. In **mild** cases by strict diet—limiting those foods rich in sugar.
2. In **severe** cases by strict diet—plus insulin injections.

A faithful diabetic can be sure of his own reward in health by remembering these general rules:

1. He must understand his own diet and treatment.
2. He must be able to examine his own urine for sugar by Benedict's test and understand the results.
3. He must **never** break his diet or omit his insulin.
4. He should visit his doctor regularly, bringing a sample of his urine.
5. He should have an abundance of rest and sleep and lead a life of moderation in all respects.
6. He should take as much mild exercise as he can without getting tired.
7. He must endeavour to avoid the risks of common colds or other infections.
8. Above all he must immediately call in a doctor if anything goes wrong.

CARD 3. Special Instructions for Insulin Patients:

Insulin means life to the severe diabetic. All patients taking insulin should observe the following rules very carefully:

The Syringe and its Care:

The syringe used is a 2 cubic centimetre one holding a total of 80 units. Each division equals 2 units of insulin. The syringe should be kept absolutely clean and free from germs. It is best to keep the syringe and needle when not in use in methylated spirits. The spirit should completely cover the syringe and should be changed every week.

Places for Injections:

1. The arms (if someone else is giving the injection).
2. The outer sides of the thighs.
3. The abdominal wall.
4. The lower part of the chest.

When injecting insulin, lift the skin away from the muscles and see that the injection goes beneath the skin and not into it. An injection either into the skin or into the muscle is often painful. Do not inject in the same place more than once during any fortnight.

Times of Injections:

Injections are given half an hour before a meal unless ordered otherwise. The doctor's instruction should be carefully adhered to.

Precautions:

1. Shake the insulin bottle before use.
2. When using both zinc protamine (cloudy) or globin insulin, and plain insulin (clear), together in the same syringe, take up the **plain** insulin into the syringe **first.**

CARD 4

It is important that every patient should know the signs of an overdose of insulin and should know what to do.

Signs of an Overdose:

1. A general feeling of anxiety.
2. A feeling of general weakness and listlessness.
3. Tremors of the hands and knees.
4. Palpitation of the heart.
5. Giddiness.
6. Hot flushes and sweating.
7. Sometimes a feeling of cold.
8. Sometimes a feeling of great hunger.
9. Dimness of eyesight or double vision.

Usually only one or two of these signs are noticed.

What to Do:

1. Give sugar immediately. Either one or two tablespoons of sugar, some barley sugar or half an orange. If after fifteen minutes the patient is still ill give some more sugar.
2. Reduce the next dose of insulin by two units.
3. Consult the doctor as soon as possible.

Causes of an Overdose:

1. Too little starch or sugar in diet.
2. Excessive exercise.
3. Improvement in the diabetic condition without suitable reduction of insulin.
4. An accidental overdose of insulin.

CARD 5. Acid Intoxication and Diabetic Coma:

If the urine shows acetone it is a danger sign.

If the amount of acetone is excessive it indicates acid intoxication which may lead to coma.

Causes of Acid Intoxication:

1. Overeating.
2. Eating food not given in diet.
3. Any illness is liable to cause it.
4. Missing doses of insulin or insufficient insulin.
5. Eating of foods known as dangerous foods.

Signs of Acid Intoxication:

1. Extreme thirst.
2. Vomiting is common.
3. Pains in abdomen.
4. Dry skin.
5. General feeling of ill-health.
6. Dim vision.
7. Breathlessness.
8. Drowsiness and giddiness.
9. Marked sugar in urine.
10. Marked acetone in urine.

What to Do:

1. Send for the doctor immediately.
2. Go to bed.
3. Keep warm.
4. Empty the bowels.
5. Take a cupful of fluid every hour.

DIABETIC IN-PATIENTS

1. Coma or pre-comatose patients.

2. Moderately severe cases.

Coma:

Standing Orders: A. Hypoglycaemia.
B. Hyperglycaemia.

Moderately Severe Cases:

The patient after admission is given a glucose tolerance test and then, depending on the level of blood sugar, and taking into account other factors such as age and weight, is put on a basal quantitative diet, with or without insulin.

Having achieved stabilisation on a basal diet, a maintenance diet is adopted either directly or by a ladder method.

The occupation of the patient decides the number of calories required.

DIABETIC DIETS

CARD X: Front—

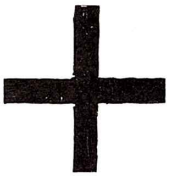
Diets	TOTAL DIET				CARBOHYDRATE (C)							PROTEIN & FAT (PF)					
	Carbo-hydrate	Protein	Fat	Calories	5 per cent Vegetables	10 per cent Vegetables	Orange	Oatmeal	Potato	Bread	Milk	Egg	Meat	Bacon	20 per cent Cream	Butter
A.	110	50	61	1189	300	150	400	15	60	30	120	1	75	—	120	15
B.	122	55	73	1365	300	150	400	15	90	30	240	1	75	—	120	25
C.	131	60	81	1493	300	150	400	15	90	45	240	1	75	15	120	25
D.	140	73	92	1680	300	150	400	15	90	60	240	1	120	15	120	30
E.	151	82	99	1823	300	—	400	15	150	75	240	1	150	20	120	30
F.	160	85	104	1916	300	—	400	15	150	90	240	1	150	30	120	30
G.	172	95	121	2157	300	—	400	15	210	90	240	1	180	30	120	45
H.																
Ac. ill. ..	152	50	52	1276	—	—	400	15	—	90	960	1	—	—	—	15

Approximate equivalents: 1 small orange (100 gms.) equals ½ banana (50 gms.) equals ½ saucer oatmeal (15 gms. dry or 120 gms. cooked) equals 2 large saucers (300gms.) 5 per cent vegetables equals 1 large saucer (150 gms.) 10 per cent vegetables equals potato size of egg equals ½ slice (15 gms.) bread.
N.B.: The above table in many cases is inadequate for maintenance requirement.

FOOD VALUES

As an analysis of foods commonly used in New Zealand is at present being made, the tables included in the previous editions of the Manual have been deleted.

CARD Y: Outside:—

Back	Front
I AM A DIABETIC If I am UNCONSCIOUS Call a Doctor at once or send me to hospital immediately. If I am PALE, FAINT or DROWSY NERVOUS, TREMBLING or IRRITABLE Give me a sweetened drink. If no improvement follows within ten minutes **Call a Doctor or send me to Hospital.**	CHRISTCHURCH HOSPITAL **DIABETIC CLINIC**  **For First Aid Instructions see back cover.**

Card Y: Inside:—

Name..... No.....

Private Address .....

Date	Insulin Dosage	Doctor's Initials
	M E	
	M E	
	M E	
	M E	
	M E	
	M E	
	M E	
	M E	

DIABETIC COMA

Recommendations in the Management of Diabetic Coma:

1. Diabetic Coma is a Medical emergency.
2. As these cases require at least 12 hours continuous observation, the Medical Officer in Charge shall be released from routine duties for that period. His duties shall be allocated by the Senior Resident.
3. The Visiting Physician in charge of the case is responsible for the treatment, and therefore, should be notified immediately the case is admitted.
4. It is desirable for the Visiting Physician to see the case as early as possible in order that treatment may be efficiently directed.
5. It is the duty both of the Admitting Officer and of the Ward Sister to inform at once the Medical Officer concerned, that a case of diabetic coma has been admitted to Hospital.
   It must be constantly kept in mind that the successful treatment of diabetic coma hinges on the immediate and fearless use of large doses of insulin, and that all other forms of therapy should be subordinated to this end.

General:

History and physical examination should be complete, but as rapid as is compatible with establishing the diagnosis of Diabetic Coma, and of the secondary illness that is likely to be accompanying it.

In cases where Diabetic Coma is a reasonable possibility, a specimen of blood should be obtained immediately for sugar estimation, and the urine examined for sugar and acetone. If the patient cannot void urine insert an indwelling catheter.

1. **Insulin:** In the average case (adult-drowsy-with Blood Pressure over 100 mm) give immediately:

   50 Units of plain Insulin subcutaneously.
   50 Units of plain Insulin intravenously.
   Commence Saline Drip and perform gastric Lavage. (See later). Thirty minutes later repeat the 50 Units of subcutaneous Insulin.

At this stage, the Blood Sugar reading should be available and usually two further doses of 50 Units at half-hourly intervals will be necessary, that is about 200-250 Units in the first two hours.

With a profoundly shocked patient, however, and a Blood Sugar of over 600 mgms, an initial dose of 50 Units Insulin intravenously and 100 Units subcutaneously, repeated in half an hour, making a total of 300 Units in the first hour, would not be excessive.

At this stage another Blood Sugar and Urine examination will show whether treatment should be more or less vigorous. If there has been little or no response 100 Units of subcutaneous insulin may be given at half or one hourly intervals. If, however, the Blood Sugar has commenced to fall satisfactorily, and if the patient is able to pass urine, the subsequent insulin dosage may be

gauged by two-hourly qualitative Benedict's Tests and Urinary Acetone; according to the following plan:

Benedict's	Red	Orange	Yellow	Yellow-Green	Green-Blue
Insulin	25	20	15	10	0 units

As the patient's condition improves and the Blood Sugar approaches normal, increase the interval of collection of specimen and giving of insulin to four hours.

2. **Fluid and Salts:** The Treatment of dehydration is second only in importance to Insulin Therapy:

(*a*) Moderate dehydration: Short history of coma, dryness of mucous membranes, slight vomiting, and decreased tension of eyeballs, requires approximately 3000 cc normal saline to correct fluid for daily requirements.

(*b*) Severe dehydration: Longer history of coma; pronounced dryness of mucous membranes—vomiting—and/or dilatation of stomach—negligible urinary output, etc. These cases require 4-7 litres of normal saline.

The clinical estimation of dehydration can be checked by Hb. estimation, and quantity of saline required by blood chloride estimation.

The giving of fluid **by mouth** should be strictly limited to 100 cc per hour and then only after the stomach has been washed out.

3. **Gastric Lavage:** This should be done as AN INVARIABLE PROCEDURE shortly after admission, with warm water. Removal of the contents relieves nausea and vomiting, and paves the way for the early administration of fluids and food.

4. **Glucose and Food:** A sufficient supply of glucose is present in the body tissues to make possible glycogen formation during the 6-8 hours which may necessarily precede the resumption of the diabetic diet. It is not only unnecessary, but may be harmful to give glucose either orally or intravenously during the first few hours of treatment.

The administration of food should be started four to six hours after admission, provided sufficient insulin has been given to bring about clinical improvement. 10 grams of carbohydrate given four hourly for 24 hours in the form of four ounces of orange juice is satisfactory. If for any reason the patient cannot be fed by mouth then 2000 cc of 5 per cent glucose intravenously will provide adequate nourishment. Meanwhile insulin is given in accordance with four-hourly urine tests.

During the next 24 hours it should be possible to start the patient on a low caloric diet such as C. 152, P. 50, F. 52.

5. **Enemata:** A cleansing enema should be given within the first few hours of treatment particularly if there is abdominal distension.

6. **Stimulants:** If there are signs of peripheral circulatory failure, i.e. very low blood pressure, rapid weak pulse, and cold extremities which do not respond to insulin, saline and warmth, plasma transfusions are indicated.

Note: 1,000 cc of 5 per cent glucose equal 50 grams of glucose (approx.).
Sugar, 2 large lumps or 2 teaspoons equal 10 gms.
Glucose, $\frac{1}{3}$ oz. or 2 teaspoons equal 10 gms.
Glucose, 2 level tablespoons equal 25 gms.
Benger's, 2 level teaspoons equal 10 gms.
Horlick's, 2 heaped teaspoons equal 10 gms.
Ovaltine, 2 very full teaspoons equal 10 gms.
Orange Juice, 4 oz. equal 10 gms.
Milk, 7 oz. equal 10 gms.

TREATMENT OF HYPOGLYCAEMIA

1. If mild—hurry the next meal.
2. Take sugar and rest, as exercise exacerbates symptoms. If symptoms fail to disappear, take further two lumps of sugar **or** 10 gms. glucose. If no sugar available use bread or orange juice.
3. If condition so severe that patient cannot swallow, give $\frac{1}{2}$-1 cc adrenalin subcutaneously. This will usually rouse the patient enough to swallow the glucose.
4. For intravenous injection 50 per cent sterilized glucose is available in every ward.

ARTHRITIS

The various diseases included under this term must be treated and dieted on general principles. The diet should provide an adequate supply of calories and the various components should be well balanced. There must be an abundance of inorganic salts and vitamins.

A normal diet should be departed from only to meet the individual's idiosyncrasy but obese patients should be given a low caloric diet.

GOUT

There is still no general agreement as to the efficacy of dietetic measures. One school advises the enforcement of a low purine diet by the exclusion of kidney, liver, sweetbreads, sardines, brains, meat extracts, etc.

Bartels recommends a diet low in purines and fats and high in carbohydrates.

CARDIOLOGY DEPARTMENT

(*Cardiologist*: DR. MALCOLM GRAY)

LOW SODIUM AND SODIUM-FREE DIETS

The comparative amounts of salt (grams per day) contained in diets varying in degree of salt restriction are as follows—

(1) Average diet, without salt restriction: 6-15 gms. salt (2.4–6.0 gms. sodium).
(2) Average diet, without additional salt for table use: 4-7 gms. salt (1.6–2.8 gms. sodium).
(3) Average diet, without additional salt for cooking: 4 gms. salt (1.6 gms. sodium).
(4) Low sodium diet: 1.5-2.0 gms. salt (.6–.8 gms. sodium).

The following precautions are necessary in the diet low in Sodium:

(1) Salt, soda or baking powder should not be used in cooking or otherwise.
(2) Salty appetisers such as nuts, potato chips, smoked fish, cheese, etc. are not permissible.
(3) Sodium medication should be withheld.

Salt Substitute: Equal parts of potassium chloride, and ammonium chloride.

STRICT CARDIAC DIET

Suitable for Congestive Heart Failure with Oedema

APPROXIMATE ANALYSIS:

Calories: 870	Carbohydrate: 110 gms.
Protein: 40 gms.	Fat: 30 gms.
Sodium: .6gms.	Fluids as desired.

SAMPLE DIET.

Breakfast. Strained oatmeal or Creamoata 4 oz. Bread or fairy toast 1 oz. with 1 teaspoon honey. Cup of tea (half-hour after meal).

10 a.m. Egg flip (egg 1, milk 4 oz.).

Dinner. Chicken or fish, etc. 2 oz. Vegetable puree 2 oz., e.g. carrots. Potato puree 2 oz. Fruit puree, e.g. apple, 2 oz. Cup of tea (half-hour after meal).

Tea. Milk pudding 4 oz., e.g. semolina. Bread or fairy toast ½ oz. with 1 teaspoon honey. Cup of tea (half-hour after meal).

7 p.m. Orange juice 4 oz., with glucose ½ oz.

Daily Ration: Butter ⅓ oz., milk 12 oz.

N.B.: In this diet no salt is to be used in the cooking or service of meal. If a further sodium restriction is desired, salt free bread and butter may be ordered, which reduces sodium intake to approximately .4 gms.

CARDIAC DIET

Suitable for Congestive Heart Failure

APPROXIMATE ANALYSIS:

Calories: 1530	Carbohydrate: 165 gms.
Protein: 60 gms.	Fat: 70 gms.
Sodium: 1.0 gm.	Fluids as desired.

SAMPLE DIET

Breakfast. Strained porridge or Creamoata 4 oz. Bread or fairy toast 1 oz., with 2 teaspoons honey. Egg 1. Cup of tea (half-hour after meal).

10 a.m. Orange juice 4 oz., with glucose ½ oz.

Dinner. Light meat 2 oz. Vegetable puree, e g. carrots, 4 oz. Potato puree 3 oz. Stewed fruit (soft), e.g. apple, 4 oz. Cream, 1 tablespoon.

3 p.m. Milk beverage 4 oz. Biscuit, 1 salt free.

Tea. Bread 1 oz. or fairy toast with 2 teaspoons honey. Egg 1 or equivalent. Cereal pudding 4 oz. Cup of tea (half-hour after meal).

7 p.m. Milk beverage 8 oz.

Daily Ration: Butter ¾ oz. milk 1 pint.

N.B.: In this diet no salt is to be used in the cooking or service of meals. If a further sodium restriction is desired, salt-free bread and butter may be ordered, which reduces sodium intake to .68 gms. sodium.

INSTRUCTIONS FOR CONVALESCENT CARDIAC PATIENTS

Eat slowly, chew your food thoroughly, and exercise moderation in all things.

Meals should be small, dry, and easily digestible, and should be taken at regular intervals.

Bread stuffs should be taken in the form of day-old bread or crisp toast.

Vegetables such as carrots, marrow, cauliflower tips, asparagus, tomato, spinach, flowery potato, may be taken in moderation; avoid any vegetables which may cause discomfort.

Eggs should be lightly cooked and never fried.

Fluids taken as needed. It is unnecessary to be thirsty, but do not drink just for the sake of drinking.

Butter, cream, honey, marmalade, jam, may be taken if patient is not over weight, in which case they must be used sparingly.

Salt should be restricted to use in cooking, (1 teaspoon daily).

Undesirable Foods:

New bread, scones, fruit cakes, or heavy steamed puddings. Soup or other fluid meals, unless taken separately. Pork, goose, salmon, herrings, sardines, salted meats. All fried foods and pastry. Alcohol, unless specially permitted by the Physician. Vegetables are necessary, but large amounts of peas, lentils, cabbage, onions, and leeks should be avoided.

SAMPLE DISCHARGE CARDIAC DIET

1800 Calories

Breakfast. Porridge, one serving, 4 oz. with milk and sugar. Egg 1, or fish and tomatoes. One slice of toast and marmalade. Cup of tea (half-hour after meal).

10 a.m. Orange juice 4 oz. with glucose.

Dinner. Light meat 2 oz., medium serving. Potato 2 oz., vegetables (green and root) 4 oz. Stewed fruit and cereal pudding or light dessert 4 oz. Cream 1 oz. (if desired).

3 p.m. Cup of tea and biscuits.

Tea. Savoury tea such as eggs 2, or cheese custard or scalloped brains, etc. One slice of toast and jam. Raw fruit 6 oz. Cup of tea (half-hour after meal).

7 p.m. Milk beverage, e.g. Ovaltine, weak coffee, etc.

Daily Ration: Milk 1 pint, butter 1 oz.

SPASTIC CONSTIPATION

Diet providing adequate bulk but avoiding coarse residue.

Foods Allowed:

Milk. Buttermilk preferable to sweet milk.
Fruits. Pureed or juice—not more than twice daily.
Meat. Ground—fish or poultry—one serving per day.
Bacon. Crisp—no fibrous parts.
Bread. Day-old white or wheatgerm, preferably as rusks or fairy toast.
Cereals. Refined only.
Vegetables. Pureed.
Soups. Cream of pureed vegetable soups or soup without excessive seasoning.
Sugar. In small amounts.

Undesirable Foods:

Fruits and vegetables (except sieved or as juice). Pork sausages, saveloys. Strong cheese. Rich cakes, puddings and pastries. Fresh bread, scones. Wholegrain cereals. Nuts, Fried foods. Highly seasoned foods.

Sample Menu:

Approximate Calories: 2000-3000
Protein: 120 gms.
Carbohydrate: 320 gms.
Fat: 145 gms.

Early a.m. Orange juice and water, ½ pint.

Breakfast. Strained porridge. Eggs **or** fish **or** crisp bacon. White bread, day-old. Butter, honey or jelly. Weak tea with milk and sugar.

11 a.m. Fruit drink, ½ pint, using 3½ oz. juice.

Dinner. Cream soup. Fish, tripe, brains, sweetbreads, chicken, tender liver, lamb chops, etc. Potato, mashed. Pureed vegetables. Custard **or** milk sweet and pureed fruit. Cream.

3 p.m. Weak tea with milk and sugar. Sandwich of white bread and yeast extract. Plain cake or biscuit.

Tea. Fish **or** eggs, 2 **or** light equivalent. Pureed vegetables. Biscuits. Butter. Cream cheese.

Other Factors:

Regular meals. Thorough mastication. Ingestion of sufficient fluids. Adequate rest—mental and physical. Establish regular bowel habits—paraffin is most desirable.
Eliminate any allergic factor.

ATONIC CONSTIPATION

The taking of food or water into the empty stomach is a definite stimulus to peristalsis of the large intestine. The impulse to evacuate the bowels, therefore, is usually strongest after a meal and particularly after breakfast. Irregular hours or the omission of breakfast is often a contributing factor in constipation. The drinking of a glass or two of water on rising in the morning when the stomach is empty stimulates the intestinal movement. The addition of brewer's yeast is beneficial.

Kinds of Food to Use. To correct constipation, vegetables of all kinds, especially lettuce, cabbage, celery, spinach, onions, turnips, parsnips, peas, beans, asparagus, tomatoes, etc.

Fruit, all Kinds. Especially apples, apricots, peaches, plums, pears, grapes, prunes, dates, raisins, figs, oranges, grapefruit and rhubarb.

Cereals—such as rolled oats, shredded wheat, and wholemeal bread.

Bran. Useful to many people but its long continued use is not recommended.

Wheatgerm is beneficial and may be sprinkled on porridge or fruit.

Honey and Black Treacle are especially good, as much as can be conveniently taken.

SAMPLE DIET

Approximate Composition:

Calories: 2800
Protein: 91 gms.
Carbohydrate: 350 gms.
Fat: 112 gms.

On Rising. Glass of water and brewer's yeast, 1 teaspoon.

Breakfast. Porridge and wheatgerm. Stewed fruit (prunes). Egg and bacon **or** tomato and bacon, liver, etc. Wholemeal bread, butter, yeast extract, treacle, honey, etc.

10 a.m. Raw fruit.

Dinner. Vegetable soup. Any meat or fish. Vegetables, large serving green (cabbage, onion). Root vegetables, small serving (swedes, turnip). Potato in jacket. Fresh, preserved or stewed fruit, especially prunes. Milk pudding or other dessert. Cream.

3 p.m. Bran biscuits or bran and raisin gems or wholemeal sandwiches with lettuce, tomato, etc.

Tea. Eggs, cheese, meat, fish, etc. Salad—raw vegetables. Wholemeal bread, butter, honey, treacle, yeast extract, etc. Wholemeal scones and raisins, etc. Raw fruit.

On Retiring. Glass of water.

Daily. Eight glasses of fluid.

Avoid laxative medicines—mineral oils and agar are often beneficial in overcoming dyschezia.

BRIGHT'S DISEASE AND HYPERTENSION

The Dietetic Management is considered under the following heads:

1. Acute Nephritis, Diets A, B, C.
2. Chronic Nephritis with Oedema.
3. Chronic Nephritis without Oedema: (*a*) Compensated.
   (*b*) Uncompensated.

Hypertension: (*a*) Simple.
(*b*) Malignant.

ACUTE NEPHRITIS

Since there is no active therapeutic agent to employ, treatment must be confined to regulation of the water balance, adjustment of the various mineral salts, supervision of the diet in an effort to maintain optimum nutrition, and the enforcement of adequate rest.

Pending blood and urine examinations the patient should be placed on a diet restricted to fluids especially if uraemia is developing or threatening.

When these tests are completed the amount of fluid given should be guided by the presence or absence of oedema or signs of heart failure. Since nephritis is accompanied by a disturbance of the water balance of the body and water plays a very important role in the prevention of acidosis the patient's water intake must be carefully considered in the treatment schedule. The primary

means of estimating the desirable intake is by comparing it with the urinary output remembering, however, the amount of water lost through other agents of the body.

Except in the case of severe oedema a rigid exclusion of salt is unwise as this makes the food insipid. As a general rule it is advisable to place the patient on Diet A for a few days until full investigation has been completed, and to advance through Diet B to C. It may not be necessary to adhere to Diet B for long but the patient should be kept on Diet C until recovery has taken place or the condition has become stabilised.

ACUTE NEPHRITIS — DIET A
(20 grams Protein)

In severe cases and until investigations have been made (see Acute Nephritis) confine the diet to fluids which should be limited to 1½ pints daily. Milk (citrated) 20 oz. Orange juice and glucose 10 oz. (200 cc. orange juice + 85 gms. glucose).

Calories: 760. Carbohydrate: 125 gms.
Protein: 20 gms. Fat: 20 gms.

7 a.m. 5 oz. citrated milk.
10 a.m. 5 oz. orange juice and glucose.
1 p.m. 5 oz. citrated milk.
4 p.m. 5 oz. orange juice and glucose.
7 p.m. 5 oz. citrated milk.
During night: 5 oz. citrated milk.

With improvement in renal condition, the milk can wholly or partly be replaced by milk and cream mixture, while bread and butter, Benger's food, arrowroot, and other light cereals may be added.

ACUTE NEPHRITIS DIET B
(40 grams Protein)

Acute symptoms present but no threatening uraemia:

Although dysfunction may be severe, the kidneys cannot be spared work by unduly restricting the intake of fluids and foodstuffs.

If protein is restricted below a certain level the tissue proteins will be katabolized, thus producing nitrogenous bodies which must be excreted. Further, if the caloric intake is reduced below the basal metabolic requirement then tissue substances including protein will be katabolized.

APPROXIMATE COMPOSITION:

Calories: 1800 Protein: 40 gms.

	Protein
Breakfast. Breakfast cereal, average serving (4 oz.)	1.5
Stewed fruit (no prunes, plums, rhubarb)	
Wholemeal bread 1½ slices (1½ oz.)	3.0
Butter and marmalade. Weak tea with milk from ration.	

		Protein
10 a.m.	Orange juice ½ glass, and glucose.	
Dinner.	Potato (average serving) 4 oz. - - - -	2.0
	Vegetables (green and root) 4 oz. - - - -	2.0
	Sauce.	
	Cereal pudding (made from milk ration) - - -	1.0
	Stewed fruit (average serving).	
	Cream 1 oz. - - - - - -	1.0
Tea.	Egg 1, or equivalent, e.g. cheese, fish (1 oz.) - -	6.0
	Wholemeal bread 2 slices (2 oz.) - - - -	4.0
	Butter and jam. Raw or stewed fruit. Milk from ration.	
Supper.	Remainder of milk.	
Ration:	Milk 20 oz., butter 1 oz. - - - - -	20.0
		40.5 gms.

Total Fluids: The amount will depend on the urinary output. Omit salt if oedema is present. If desired, calorie intake can be increased by the addition of carbohydrate or fat.

ACUTE NEPHRITIS DIET C

(60 grams Protein)

APPROXIMATE COMPOSITION:

Calories: 2000 Protein: 60 gms.

		Protein
Breakfast.	Breakfast cereal, average serving - - -	1.5
	Stewed fruit (no prunes, plums, rhubarb).	
	Wholemeal bread 2 slices (2 oz.) - - - -	4.0
	Butter and marmalade.	
10 a.m.	Orange juice ½ glass, and glucose.	
Dinner.	Meat or fish or poultry, 2 oz. - - - -	16.0
	Potato, average serving - - - - -	2.0
	Vegetables (green, root) - - - - -	2.0
	Cereal pudding (made from milk ration) - - -	1.0
	Stewed fruit.	
	Cream 1 oz. - - - - - -	1.0
Tea.	Egg 1, or equivalent, with salad - - - -	6.0
	Bread (wholemeal) 3 slices (3 oz.) - - -	6.0
	Butter and jam. Raw fruit.	
Supper.	Remainder of milk.	
Rations:	Milk 20 oz., butter 1 oz. - - - -	20.0
		59.5 gms.

Total Fluids: The amount will depend on the urinary output. Omit salt if oedema is present. If desired, calorie intake can be increased by the addition of carbohydrate or fat.

CHRONIC NEPHRITIS WITH OEDEMA

(Low Sodium-High Protein Diet)

APPROXIMATE ANALYSIS:

Calories: 2250 — Sodium: 1.3 gms.
Protein: 134 gms. — Fluids: 2-2½ pints.

SAMPLE MENU		Weight grams	Protein grams	Sodium grams
8 a.m.	Porridge (15 gms. dry)	120	1.5	—
	Skim milk powder	15	5.0	.091
	Milk	60	2.0	.030
	Eggs	2	12.0	.070
	Bread, salt-free	30	2.0	—
	Marmalade	10	—	—
	Cup of tea: milk	30	1.0	.015
	fluid	120	—	—
10 a.m.	Orange juice	120	—	—
	Glucose	30	—	—
	Water	120	—	—
Noon.	Light meat	120	32.0	.094
	Vegetables, salt-free	60	1.0	—
	Potato	60	1.0	—
	Skim milk powder	15	5.0	.091
	Stewed fruit	120	—	—
	Sweet: milk	120	4.0	.061
	Sweet: Cereal	10	1.0	—
	Sweet: Skim milk powder	15	5.0	.091
	Cream	30	1.0	—
3 p.m.	Biscuit with high-protein drink	15	1.0	—
6 p.m.	Bread, salt-free	30	2.0	—
	Meat, light	120	32.0	.094
	Raw fruit	120	—	—
	Jam	10	—	—
	Tea: milk	30	1.0	.015
	Tea: Fluid	120	—	—
	High-protein feed for day	300	24.0	.668
	Salt-free butter for day	20	—	—
			133.5	1.320

This diet is adequate in all food requirements.

This diet should only be ordered by the Physician in charge of the case when the excretory capacity of the kidney has been shown to be fully adequate. In contrary cases (raised T.N.P.N., etc.) it may be advisable to use Diet C. It is possible from time to time to give transfusions of serum in order to restore some of the plasma protein which has been lost.

CHRONIC NEPHRITIS WITHOUT OEDEMA

1. **Compensated:**

Here the total amount of urine excreted is satisfactory because of the increased diuresis.

Diet. Normal with possibly a slight restriction of protein, e.g. to 55-60 grams with ample carbohydrate calories.

2. **Uncompensated:**

Here the total excretion is impaired so that the T.N.P.N. is rising and the amount of protein must be adjusted to the amount of nitrogen in the blood. If the T.N.P.N. reading is 65-70 it may suffice to give 40-50 grams of protein.

HYPERTENSION

(1) **Simple:**

Where there is adequate excretory function give a normal diet with reduced calories in obese patients.

(2) **Malignant:**

The diet should correspond to that recommended for chronic nephritis. The essential point is the excretory capacity of the kidneys.

TOXAEMIA OF PREGNANCY

The most modern diet recommended is a low sodium, high protein, restricted fluid diet similar to that used for nephritic oedema (see page 105).

DEPARTMENT OF SURGERY

(*Director*: MR. L. A. BENNETT)

The diets commonly used in surgery are similar to those employed in general medical treatment.

The following diets may be used in special pre- and post-operative conditions.

GALL-BLADDER DISEASE

Pre-operative Treatment: 1. High carbohydrate.
2. Vitamin K.
3. Bile salts.
4. Calcium salts.
5. Copious fluids.
6. Vitamin C.

Post-operative Treatment:

Each case should be treated on its merits. Some patients suffer from reflex dyspepsia, which condition must be treated dietetically. Post-operatively the patient will be able to judge for himself his tolerance or intolerance to fat and diet himself accordingly.

HIGH-PROTEIN MILK MIXTURE

APPROXIMATE ANALYSIS:

Calories: 1137	Volume: 40 oz., equals 1200 cc.
Protein: 96 gms.	Vitamin A: 994 I.U.
Carbohydrate: 132 gms.	Thiamin: .76 mg.
Fat: 25 gms.	Riboflavin: 3.16 mgs.
Calcium: 2.1 gms.	Niacin: 1.8 mgs.
Iron: 1.7 gms.	Vitamin C: 95.2 mgs.

Whole milk: 24 oz.
Skim milk powder: 100 gms.
Salt: ½ teaspoon.
Egg whites: 6.
Orange juice: 6 oz. or rose hip syrup.

N.B.: This mixture is suitable for supplementing the dietary to—
(1) increase the protein intake;
(2) increase the total calories.

LIQUID DIETS

Sample Diets	Calories 2000 P 96, C 242, F 66	Calories 2500 P 130, C 270, F 100	Calories 3000 P 200, C 323, F 100
Milk - -	30 oz.	40 oz.	40 oz.
Eggs - -	4	6	6
Glucose - -	150 gms.	150 gms.	105 gms.
Sodium chloride -	½ teaspoon	½ teaspoon	1 teaspoon
Cream - -	60 gms.	120 gms.	120 gms.
Skimmed milk pdr.	120 gms.	150 gms.	360 gms.
Orange juice -	150 gms	150 gms.	120 gms.
Volume - -	1400 cc	1800 cc	2100 cc

These mixtures are adequate in all essential food requirements except Iron Vitamin A, Thiamin, and Nicotinic Acid.

Vitamin supplements must be prescribed, e.g. Aktavite, which also acts as a flavouring agent.

The mixtures are suitable for tube feeds, where the sole nourishment must be furnished in a liquid form, i.e. dysphagia, obstruction, etc.

GASTRIC SURGERY

Pre-operative Regime

Prior to gastric surgery, a patient, whenever possible, should be given a high protein diet. In these cases a special high-protein pre-operative diet should be ordered by the surgeon.

Calories: 2900	Carbohydrate: 320 gms.
Protein: 150 gms.	Fat: 115 gms.

This is obtained by using the peptic ulcer diet, stage "B", with supplementary feeds of 16 oz. protein drink (see page 107) to replace 16 oz. whole milk.

If a higher protein intake is desired, additional high-protein liquid may be ordered, *or* skim milk powder (5 gms. protein in 15 gms. skim milk powder) may be incorporated in foods such as milk puddings, porridge, white sauce and mashed potato.

Post-operative Regime

Post-operatively the protein intake must be maintained at a high level. A high protein diet as above may be ordered, or in cases where liquids only are permitted either orally or per tube, the liquid high-protein diets should be ordered.

THE DAILY DIETARY PLAN FOR NEW ZEALAND

(Health Department)

THE FOLLOWING FOODS ARE REQUIRED DAILY:

Milk. For pre-school children $1\frac{1}{3}$-$1\frac{3}{4}$ pints; for school children and adolescents not less than $1\frac{3}{4}$ pints, including school milk; and for adults not less than 1 pint.

Eggs. One a day when possible, at least 3-5 per week.

Cheese. A small cube every day.

Meat. A serving once a day. Serve liver at least once a week, and fish when possible once a week.

Potatoes. At least once a day a generous serving, and for adolescents twice this amount.

Vegetables. Green vegetable, cauliflower, or swede every day, and one other vegetable at any of the three meals of the day.

Fruit. One raw fruit in addition to whatever is used stewed or dried. The following fruits are most valuable and should be used, raw or cooked, whenever available: black or red currants; gooseberries, Chinese gooseberries; oranges, grapefruit, or their tinned juices; raspberries and other berries; tree tomatoes and ordinary tomatoes; lemons; Sturmer apples. If these fruits are unavailable or in short supply, use rose hip syrup or powder.

Butter and Fat. The full ration of butter used on the table, and lard, margarine, or dripping in cooking.

Bread. At least half the day's supply should be wholemeal.

Cereals. Unrefined cereals such as oatmeal, rolled oats, or ground whole wheat should be used as porridge.

Iodised Salt. Iodised salt for all purposes, in cooking as well as on the table.

Cod Liver Oil (or substitute). One teaspoon daily for all pre-school children, and for expectant and nursing mothers. In winter and spring months it is advisable to include this in the dietary of older children.

Additional Foods, e.g. honey, jam, marmalade, yeast extract, peanut butter, scones, etc. to satisfy appetite.

(Ref. Nutrition Review, October 1948, page 319)

RECOMMENDED DAILY DIETARY ALLOWANCES
Revised 1948

	Calories	Protein	Calcium	Iron	Vit. A	Thiamine	Ribfl.	Nic. Acid	Ascor. Acid	Vit. D
		grams	grams	mg.	I.U.	mg.	mg.	mg.	mg.	I.U.
MAN (154lb., 70Kg.): Sedentary	2400	70	1.0	12	5000	1.2	1.8	12	75	—
Physically active	3000	70	1.0	12	5000	1.5	1.8	15	75	—
With heavy work	4500	70	1.0	12	5000	1.8	1.8	18	75	—
WOMAN (123lb., 56Kg.): Sedentary	2000	60	1.0	12	5000	1.0	1.5	10	70	—
Moderately active	2400	60	1.0	12	5000	1.2	1.5	12	70	—
Very active	3000	60	1.0	12	5000	1.5	1.5	15	70	—
Pregnancy (latter half)	2400	85	1.5	15	6000	1.5	2.5	15	100	400
Lactation	3000	100	2.0	15	8000	1.5	3.0	15	150	400
CHILDREN: under 1yr.	110/kg.	3.5/kg.	1.0	6	1500	0.4	0.6	4	30	400
1-3yrs. (27lb., 12Kg.)	1200	40	1.0	7	2000	0.6	0.9	6	35	400
4-6yrs. (42lb., 19Kg.)	1600	50	1.0	8	2500	0.8	1.2	8	50	400
7-9yrs. (58 lb., 26Kg.)	2000	60	1.0	10	3500	1.0	1.5	10	60	400
10-12yrs. (78lb., 35Kg.)	2500	70	1.2	12	4500	1.2	1.8	12	75	400
CHILDREN OVER 12YRS.:										
Girls 12-15yrs (108lb., 49Kg.)	2600	80	1.3	15	5000	1.3	2.0	13	80	400
16-20yrs. (122lb., 55Kg.)	2400	75	1.0	15	5000	1.2	1.8	12	80	400
Boys 13-15yrs. (108lb., 49Kg.)	3200	85	1.4	15	5000	1.5	2.0	15	90	400
16-20yrs. (141lb., 67Kg.)	3800	100	1.4	15	6000	1.7	2.5	17	100	400

For persons working at night and for those whose habits shield them from sunlight, small amounts of Vitamin D are desirable.

APPROXIMATE FOOD VALUE OF A DAILY DIETARY SUGGESTED FOR NEW ZEALANDERS (Dr. Muriel Bell)

To fit the requirements of the foregoing table of Recommended Allowances of Specific Nutrients for a man, under conditions of moderate activity.

Foods	Amount	Approximate Measure	Calories	Protein grams	Calcium grams	Iron mg.	Vit. A. I.U.	Vit. B1 mg.	Riboflavin micrograms	Niacin mg.	Vit. C. mg.	Vit. D. I.U.
Milk	600 gm.	1 pint	414	21	.70	.12	1020	.24	1080	.66	6	20
Meat (average) ..	6 oz.	6 oz.	359	25	.021	5.65	1270	.27	494	7.50	1	—
Egg (for substitute see below)	2 oz.	1 egg	92	7	.030	1.44	400	.06	190	.030	—	80
Potatoes	10½ oz.	1½ large	216	5	.024	1.8	90	.27	90	3.03	30	0
Green vegetables ..	3½ oz.	½ cup ckd.	38	2	.032	1.66	2200	.10	140	.33	38	—
Root Vegetables, etc. ..	3½ oz.	½ cup ckd.	44	1	.038	.75	1000	.057	46	.379	9	—
Cheese	½ oz.	1 x ½ x ½in.	60	3.4	.100	.14	300	.003	70	.028	—	—
Apple (or Rhubarb, etc.)	5 oz.	5 oz. as bt.	85	.5	.007	.45	100	.03	30	.13	6	—
Tomato (fresh or preserved) or Orange Juice		½ cup ¼ cup	23	1	.007	.6	1130	.06	40	.68	25	—
Bread, Wholemeal ..	4 oz.	4 sml. slcs.	300	11	.030	3.2	—	.360	84	3.78	—	—
Bread, White	4 oz.	4 sml. slcs.	300	9	.018	1.02	—	.147	33	.85	—	—
Oatmeal	1½ oz.	1½ cps ckd	166	6	.042	1.69	—	.157	67	.595	—	—
Butter	1 1-7 oz.	8 oz. week	235	—	.007	.06	1040	.00	3	.03	—	30
Dripping or Margarine	1 oz.	1 oz.	226	—	.001	.09	—	—	—	—	—	—
Flour or other Cereal ..	2 oz.	2 oz.	200	6	.012	.68	—	.098	22	.568	—	—
Sugar	1 5-7 oz.	12 oz. wk.	194	—	—	—	—	—	—	—	—	—
Jam	½ oz.	6lb. sg. yr.	30	—	—	.18	—	—	—	—	—	—
TOTAL			2962	98	1.069	20.55	8550	1.852	2389	18.620	115	130
RECOMMENDED ALLOWANCE			3000	70	1.0	12.00	5000	1.5	1800	15.0	75	400

COMMENTS. For those requiring more calories, potatoes, cereals and fats could be taken in larger quantity. The figure for meat includes beef, mutton, and smaller amounts of rabbit, sausage, bacon, fish, liver, kidney, etc., to give an average. The figure for vegetables is similarly compounded in something like average proportions. The figures for Vitamin C. in vegetables are those obtained on the average if they are cooked with care, served immediately, and the vegetable water consumed. Any additional allowance (as tomato or orange) has been made in order to make up for the losses of this vitamin in large-scale cookery, etc. It is stated that adults and children of most ages require 400 units of Vitamin D; when it is not available from sunshine, it should be taken in the form of cod liver oil or substitute. Iodised salt must be used for cooking as well as for the table, in order to prevent goitre. A teaspoon of iodised salt per day—or 2 teaspoons of seameal—provides the amount necessary. Substitutes for eggs: dried legumes, cheese, milk, etc.

STANDARD WEIGHTS ACCORDING TO HEIGHT AND AGE PERIOD—MEN

Age Period	15 to 19	20 to 24	25 to 29	30 to 34	35 to 40	41 to 44	45 to 49	50 to 54	55 to
Height	st. lb.	st. lb.	st. lb.	st. lb.	st. lb.	st. lb.	st. lb.	st. lb.	st. lb.
ft. in.									
4 11	7 13	8 5	8 10	8 13	9 1	9 4	9 6	9 7	9 8
5 0	8 1	8 7	8 12	9 1	9 3	9 6	9 8	9 9	9 10
5 1	8 3	8 9	9 0	9 3	9 5	9 8	9 10	9 11	9 12
5 2	8 6	8 12	9 2	9 5	9 7	9 10	9 12	9 13	10 0
5 3	8 9	9 1	9 5	9 8	9 10	9 13	10 1	10 2	10 3
5 4	8 12	9 5	9 8	9 11	10 0	10 2	10 4	10 5	10 6
5 5	9 2	9 9	9 12	10 1	10 4	10 6	10 8	10 9	10 10
5 6	9 6	9 13	10 2	10 5	10 8	10 10	10 12	10 13	11 0
5 7	9 10	10 2	10 6	10 9	10 12	11 0	11 2	11 3	11 4
5 8	10 0	10 6	10 10	11 0	11 3	11 5	11 7	11 8	11 9
5 9	10 4	10 10	11 0	11 4	11 8	11 10	11 12	11 13	12 0
5 10	10 8	11 0	11 4	11 9	11 13	12 1	12 3	12 4	12 5
5 11	10 13	11 4	11 9	12 0	12 4	12 7	12 9	12 10	12 11
6 0	11 4	11 9	12 1	12 6	12 10	12 13	13 1	13 2	13 3
6 1	11 9	12 0	12 7	12 12	13 2	13 5	13 8	13 9	13 10
6 2	12 0	12 5	12 13	13 4	13 9	13 12	14 1	14 2	14 3
6 3	12 5	12 10	13 5	13 10	14 1	14 5	14 8	14 9	14 10

HEIGHT—Without shoes.

WEIGHT—Indoor clothes without shoes.

For naked weight subtract 10 lb.

STANDARD WEIGHTS ACCORDING TO HEIGHT AND AGE PERIOD—WOMEN

Age Period	15 to 19	20 to 24	25 to 29	30 to 34	35 to 39	40 to 44	45 to 49	50 to 54	55 to
Height	st. lb.	st. lb.	st. lb.	st. lb.	st. lb.	st. lb.	st. lb.	st. lb.	st. lb.
ft. in.									
4 11	7 12	8 1	8 4	8 7	8 10	9 0	9 3	9 5	9 6
5 0	8 0	8 3	8 6	8 9	8 12	9 2	9 5	9 7	9 8
5 1	8 2	8 5	8 8	8 11	9 0	9 4	9 7	9 9	9 10
5 2	8 5	8 8	8 10	8 13	9 3	9 7	9 10	9 12	10 0
5 3	8 8	8 11	8 13	9 2	9 6	9 10	9 13	10 1	10 3
5 4	8 11	9 0	9 3	9 6	9 10	9 13	10 2	10 4	10 6
5 5	9 0	9 3	9 6	9 10	10 0	10 3	10 6	10 8	10 10
5 6	9 4	9 7	9 10	10 0	10 4	10 7	10 11	10 12	10 13
5 7	9 8	9 11	10 0	10 4	10 8	10 11	11 1	11 3	11 4
5 8	9 12	10 1	10 4	10 8	10 12	11 1	11 5	11 8	11 9
5 9	10 1	10 5	10 8	10 12	11 2	11 5	11 9	11 12	11 13
5 10	10 5	10 9	10 12	11 1	11 5	11 8	11 12	12 2	12 5
5 11	10 10	10 13	11 1	11 4	11 8	11 12	12 2	12 6	12 9
6 0	11 1	11 3	11 5	11 8	11 11	12 1	12 5	12 9	13 0

HEIGHT—Without shoes.
WEIGHT—Indoor clothes without shoes.
For naked weight subtract 6 lb.

TABLE SHOWING WEIGHT, HEIGHT, AND CIRCUMFERENCE OF THE HEAD AND CHEST FROM BIRTH TO THE SIXTEENTH YEAR (HOLT)

Age	Weight in Pounds		Height in Inches		Circumference of Chest in Inches		Circumference of Head in Inches	
	Boys	Girls	Boys	Girls	Boys	Girls	Boys	Girls
Birth	7.55	7.16	20.6	20.5	13.4	13.0	13.9	13.5
6 months	16.0	15.5	25.4	25.0	16.5	16.1	17.0	16.6
12 months	20.5	19.8	29.0	28.7	18.0	17.4	18.0	17.6
18 months	22.8	22.0	30.0	29.7	18.5	18.0	18.5	18.0
2 years	26.5	25.5	32.5	32.5	19.0	18.5	18.9	18.6
3 years	31.2	30.0	35.0	35.0	20.1	19.8	19.3	19.0
4 years	35.0	34.0	38.0	38.0	20.7	20.5	19.7	19.5
5 years	41.2	39.8	41.7	41.4	21.5	21.0	20.5	20.2
6 years	45.1	43.8	44.1	43.6	23.2	22.8	—	—
7 years	49.5	48.0	46.2	45.9	23.7	23.3	—	—
8 years	54.4	52.9	48.2	48.0	24.4	23.8	—	—
9 years	60.0	57.5	50.1	49.6	25.1	24.5	—	—
10 years	66.6	64.1	52.2	51.8	25.8	24.7	21.0	20.7
11 years	72.4	70.3	54.0	53.8	26.4	25.8	—	—
12 years	79.8	81.4	55.8	57.1	27.0	26.8	—	—
13 years	88.3	91.2	58.2	58.7	27.7	28.0	—	—
14 years	99.3	100.3	61.0	60.3	28.8	29.2	—	—
15 years	110.8	108.4	63.3	61.4	30.0	30.3	21.8	21.5
16 years	123.7	113.0	65.6	61.7	31.2	30.8	—	—

The cranium is measured at the greatest horizontal circumference.

The chest is measured immediately below the shoulder blades and above the nipples, with the arms in an extended position.

WEIGHT AND CAPACITY MEASURES AND THEIR EQUIVALENTS

Measure	Equivalent
4 ounces	$\frac{1}{4}$ pound
16 ounces	1 pound
60 drops	1 teaspoonful
4 teaspoonsful	1 tablespoonful
4 tablespoonsful	$\frac{1}{4}$ cup
8 tablespoonsful	$\frac{1}{2}$ cup
16 tablespoonsful	1 cup
$2\frac{1}{2}$ cups	1 pint (20 ozs.)
5 cups	1 quart
4 quarts	1 gallon
8 quarts	1 peck

1 gram carbohydrate	4 calories
1 gram protein	4 calories
1 gram fat	9 calories
1 tablespoon	4 drams, 15 cubic centimetres
1 teaspoonful	1 dram, 4 cubic centimetres
30 cubic centimetres	1 ounce
30 grams	1 ounce
1 kilogram	2.2 pounds
600 cubic centimetres	1 pint
100 grams	$3\frac{1}{3}$ ounces
100 cubic centimetres	$3\frac{1}{3}$ fluid ounces
1 litre (1000 cubic centimetres)	35 fluid ounces (1.75 pints approximately)

NOTIFIABLE AND INFECTIOUS DISEASES

1. NOTIFICATION

A. Diseases Notifiable both to the Medical Officer of Health (Dr. J. H. Blakelock) and to the Local Authority:

Anthrax.
Cerebro-spinal Fever (Cerebro-spinal Meningitis).
Cholera.
Dengue.
Diphtheria.
Erysipelas.
Enteric Fever (Typhoid Fever, Paratyphoid Fever).
Leprosy.
Plague (Bubonic or Pneumonic).
Trachoma (Granular Conjunctivitis, Granular Ophthalmia, Granular Eyelids).
Streptococcal Sore Throat (including Scarlet Fever).
Smallpox (Variola, including Varioloid, Alastrim, Amaas, Cuban Itch and Phillipine Itch).
Typhus.
Yellow Fever.
Encephalitis Lethargica.
Fulminant Influenza.
Pneumonic Influenza.
Septicaemic Influenza.
Acute Poliomyelitis (Infantile Paralysis).
Dysentery (Amoebic and Bacillary).
Undulant Fever.

B. Diseases Notifiable to Medical Officer of Health only:

Actinomycosis.
Anchylostomiasis (Hookworm disease).
Bilharziasis (Endemic Haematuria, Egyptian Haematuria).
Beriberi.
Tetanus.
Hydatids.
Food Poisoning.
Chronic Lead Poisoning.
Phosphorus Poisoning.
Ophthalmia Neonatorum.
All forms of Tuberculosis.
Puerperal Fever (Puerperal Septicaemia, Puerperal Sapraemia) and Puerperal Fever involving any form of Puerperal Sepsis other than or in addition to Puerperal Septicaemia and Puerperal Sapraemia).
Malaria.
Septicaemia consequent upon Abortion or Miscarriage.

Any form of Sepsis or Sapraemia following Abortion or Miscarriage.
Eclampsia.

C. Infectious Diseases not at present Notifiable:

Chickenpox (Varicella).
Influenza.
Measles (Morbilli).
Mumps (Epidemic Parotitis).
Acute Primary Pneumonia.
Ringworm of the Scalp (Tinea Tonsurans).
German Measles (Rubella).
Scabies (Itch).
Whooping Cough (pertussis).
Impetigo Contagiosa.
Pediculosis.
Gonorrhoea, Syphilis, Soft Chancre (default from treatment notifiable, see Venereal Regulations, 1941).

D. Notification Forms:

(a) DISEASES IN GROUPS A AND B (other than Tuberculosis) should be notified on form H.—I.D.1.

(b) TUBERCULOSIS (ALL FORMS), if detected during life, should be notified on form H.Tb.5; if detected as a result of post-mortem examination on form H.Tb.6.

E. Tuberculosis (all forms)—Additional responsibilities of Medical Practitioners:

If any Medical Practitioner is satisfied that any person professionally attended by him is suffering from tuberculosis in an active form and is likely to infect others, he shall forthwith—

(a) Inform the patient and every person nursing or in immediate attendance on the patient that the patient is suffering from tuberculosis and is likely to infect others; and

(b) If to his knowledge there is residing in the premises in which the patient for the time being resides some other person (not being a person nursing or in immediate attendance on the patient) who is the wife or husband or a parent or guardian of the patient, inform that person that the patient is suffering from tuberculosis and is likely to infect others.

II. ISOLATION OF PERSONS SUFFERING FROM INFECTIOUS DISEASES

The instructions below apply to the following diseases, namely: cerebro-spinal fever; chicken-pox, diphtheria; dysentery (bacillary); measles (morbilli); mumps; poliomyelitis; smallpox; streptococcal sore throat (including scarlet fever); typhoid and paratyphoid fevers; and whooping-cough.

No person suffering or having suffered from any of the said diseases shall, during the period of isolation set out in the attached table, wilfully go outside the limits of the premises in which he resides, save with the authority of the Medical Officer of Health:

Provided that—

(a) Where, on account of remoteness of a laboratory, bacteriological examinations cannot conveniently be undertaken, the medical practitioner in attendance shall notify the facts to the Medical Officer of Health, who may then decide that the periods of isolation set out hereunder shall be deemed sufficient, namely:

	Weeks from Onset of Illness
Cerebro-spinal fever	2
Diphtheria	4
Dysentery (bacillary)	4
Typhoid and paratyphoid fevers	8

(b) Where a patient suffering from cerebro-spinal fever, diphtheria dysentery (bacillary), typhoid or paratyphoid fevers, has been isolated two, four, four, or eight weeks respectively, and bacteriological examinations still do not yield a negative result, the medical practitioner in attendance shall notify the fact to the Medical Officer of Health who may allow the release of the patient from isolation under such conditions as he deems necessary to safeguard the community from risk of infection.

PRESCRIBED PERIODS OF ISOLATION

Cerebro-spinal Fever (Meningococcal Meningitis). The period of isolation of a case of cerebro-spinal fever shall be fourteen days from the date of onset of the disease or until two cultures from the naso-pharynx, taken not less than twenty-four hours apart and not within twelve hours of local antiseptic applications, fail to show the presence of meningococci.

Chicken-pox (Varicella). The period of isolation of a case of chicken-pox shall be one week after the appearance of the rash.

Diphtheria. The period of isolation of a case of diphtheria shall be for at least two weeks from the date of onset of the disease and until two cultures from the throat and two from the nose, taken not less than twenty-four hours apart, and not within twelve hours of local antiseptic application, fail to show the presence of virulent diphtheria bacilli.

Dysentery, Bacillary (Shigellosis). The period of isolation of a case of dysentery shall be four weeks from the date of onset of the disease or until three bacteriological examinations of the faeces made at intervals of two days fail to show the presence of dysentery bacilli.

Measles (Morbilli). The period of isolation of a case of measles shall be for at least seven days from the date of appearance of the rash, and until recovery.

Mumps. The period of isolation of a case of mumps shall be until there is no longer a swelling of any salivary gland.

Paratyphoid Fever. The period of isolation of a case of paratyphoid fever shall be not less than four weeks from the date of onset of the disease and until three successive bacteriological examinations of both faeces and urine, collected at intervals of not less than forty-eight hours, have failed to show the presence of paratyphoid bacilli.

Poliomyelitis. The period of isolation of a case of poliomyelitis (infantile paralysis) shall be at least three weeks from the date of onset of the disease.

Smallpox (Variola). The period of isolation of a case of smallpox shall be until all scabs and crusts have disappeared.

Streptococcal Sore Throat (including Scarlet Fever). The period of isolation of streptococcal sore throat (including scarlet fever) shall be at least two weeks from the date of onset of the disease, and until all symptoms have subsided, all abnormal discharges have ceased, and all open sores or wounds have healed.

Typhoid Fever. The period of isolation of a case of typhoid fever shall be at least four weeks from the date of onset of the disease and until three successive bacteriological examinations of both urine and faeces, collected at intervals of not less than forty-eight hours, fail to show the presence of typhoid bacilli.

Whooping-Cough. The period of isolation of a case of whooping-cough shall be three weeks after onset of typical paroxysms.

III. EXCLUSION FROM SCHOOL OF PATIENTS AND CONTACTS

Every child and every school teacher who is suffering from an infectious disease specified in the following table, or who has been exposed to infection from any such disease, shall be excluded from school for the period set out in that table with respect to that disease.

TABLE

Disease	Period of Exclusion from School of Pupils and Teachers suffering from an Infectious Disease (Patients)	Period of Exclusion from School of Pupils and Teachers exposed to infection (Contacts)
Cerebro-spinal Fever - -	Until meningococci are no longer present in the discharges from the nose and mouth, or for a period of fourteen days.	*nil*
Chicken-pox - - -	For a period of one week after the appearance of the rash.	*nil*
Diphtheria - - -	For at least two weeks from the date of onset of the disease and until two cultures from the throat and two from the nose taken not less than 24 hours apart, fail to show the presence of virulent diphtheria bacilli.	(1) Pupils to be excluded for five days from the last exposure to infection. (2) Teachers to be excluded for five days from the last exposure to infection unless the bacteriological examination of throat and nose fails to show the presence of virulent diphtheria bacilli.
Bacillary Dysentery - -	For a period of four weeks or until the stools have been proved by bacteriological examination to be free from the causative organism.	*nil*
Measles (Morbilli) - -	For at least seven days from the date of appearance of the rash and until recovery.	(1) If the disease is epidemic, *nil.* (2) If the disease is not epidemic, teachers not to be excluded, but susceptible children to be excluded for 14 days from the appearance of the rash on the patient.
Mumps - - -	Until swelling of all involved glands has completely subsided and the patient has returned to normal.	*nil*

TABLE

Disease	Period of Exclusion from School of Pupils and Teachers suffering from an Infectious Disease (Patients)	Period of Exclusion from School of Pupils and Teachers exposed to infection (Contacts)
Poliomyelitis (Infantile Paralysis)	For at least three weeks from the onset of the disease.	Both pupils and teachers to be excluded for 14 days from last exposure to infection.
Ringworm of the Scalp - -	Until cured.	*nil*
Scabies, Trachoma, Pediculosis -	If the patient is under treatment or supervision at school, *nil.*	*nil*
Smallpox (Variola, including Varioloid alastrim)	Until all scabs and crusts have disappeared.	If the strain of smallpox is of the variola minor type, and if contacts are vaccinated within 24 hours of first exposure and thereafter kept under daily medical observation, to be excluded until height of reaction is passed: otherwise for 16 days from last exposure.
Streptococcal Sore Throat (including Scarlet Fever)	For at least two weeks from the date of onset of the disease, and until all symptoms have subsided, all abnormal discharges have ceased, and all open sores or wounds have healed.	(1) If the patient is nursed at home, until the patient is released from isolation and a certificate of clearance has been received from an inspector. (2) If patient is removed to hospital, *nil.*
Typhoid Fever, Paratyphoid Fever	For at least four weeks from the onset of the disease and until three cultures of faeces and three of urine, collected not less than 48 hours apart, fail to show the presence of typhoid or paratyphoid bacilli. When no laboratory service available, for at least eight weeks.	*nil*
Whooping-Cough - -	For at least three weeks from onset of typical paroxysms.	(1) If the pupil or teacher has had the disease, *nil.* (2) If the pupil or teacher has not had the disease, for 21 days from the onset of the last case.

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